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PHYSIOLOGICAL AND APPLIED.

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* Owing to Dr. Black's lamented decease, these medicines have been edited and seen through the press by Dr. Hughes.

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INTRODUCTION.

It may be taken for granted that with the exception of chemical antidotes and anti-parasitics, which act on the exciting cause, all drugs must act therapeutically only by virtue of their physiological action on the healthy body. Whatever the relation be, therefore, between the physiological and the therapeutic action, it is obvious that the first essential of a materia medica must be the complete description of the effects of drugs on the healthy body. Such a description must be the source from which all rational use in disease is to be derived; and if there are still medicines the knowledge of whose virtues is wholly empirical, derived from experience in disease alone, and not capable of being brought into connection with any known physiological action of theirs, this shows only the imperfection of our knowledge of the latter or ignorance of the law or laws of specific cures. Our hopes of bringing all the therapeutic uses of medicines within the category of rational must therefore rest on the progress of our knowledge of their physiological action, as well as of general pathology as a whole. In the meantime our aim should be to exhibit in their completest form the pathogenic actions of drugs, described as far as possible in the same way as diseases are described. We must not be content with a bald classification of drugs according to their more prominent actions as excitors or depressors of the more important functions and organs of the body, such as evacuants, narcotics, astringents, stimulants, sedatives, cardiacs, hepatics, nervines, &c.: or even the still worse question-begging categories of antiphlogistics, anti-pyretics, anti-scorbutics, anodynes, &c. Who would be satisfied with descriptions of diseases after such a fashion? And yet diseases are in a manner nothing but the pathogenic effects of their causes, just as the materia medica is, or ought to be when perfect, nothing but the pathogenic effects of drugs, which are exciting causes more definite and specific than most causes of natural disease. A materia medica composed of a full and complete description of the pathogenic action of drugs on the healthy body by no means excludes, on the contrary it must include, all the information necessary for the use of each medicine in any of the above-classified categories to which it may belong. The dose, for example, must be stated in which it requires to be given to produce at will vomiting, purging, diuresis, diaphoresis, narcosis, &c.; besides which the special character of each individual evacuant, narcotic, or other representative of the classified

categories must be indicated, as shown by the attendant circumstances, the character of the evacuation, or the kind of sleep, or other phenomena special to each. With this information we shall possess all the knowledge given by the old-fashioned materia medicas, which in fact consisted of nothing else; and which was sufficient to explain rationally the therapeutic action of classified medicines in as far as these may be allowable under an enlightened pathology. For example, in cases of poisoning we may with advantage choose apomorphia as an emetic, for it acts primarily on the nerve-centres presiding over the act of vomiting; while we should choose ipecacuanaha or mustard if we wish to produce reflex stimulation of the brain or lungs by the revulsive action of emetics as irritants to the stomach. In like manner we can find a rational explanation of the use of all the classes of medicines, and often of special individuals in each class.

The advance of pathology, however, tends more and more to restrict the instances where permanent benefit can be expected from such treatment, and shows it to be mainly symptomatic, palliative, and temporary. With our present knowledge of the pathology of dropsy, for example, how seldom can we expect a permanent cure from mere evacuants acting on the kidneys or bowels? And experience amply justifies the inference. While on the other hand rational pathology tells us we have most hope of cure from medicines which may act specifically and directly on the diseased states of the heart, liver, or kidneys, which lie at the root of the obstructions causing dropsy; or on the state of the blood, or on the weakened condition of the capillary veins and lymphatics promoting effusion. So likewise in respect to the more recondite actions of drugs in stimulating or depressing certain nerve-centres and tracts. It may be rational to take advantage of the antagonistic actions of different drugs in this field in cases of poisoning, when a purpose essentially temporary is to be fulfilled, viz. elimination of the poison. For example, if a poison such as atropine tending to death by excessive stimulation and hence exhaustion of the heart's action have been taken, it may be rational to antagonise its action by stimulating the inhibitory intra-cardiac centres by muscaria, so that a sufficiently equable action of the heart may be maintained long enough for the poison to be eliminated, and thus life preserved. Or strychnia may be employed to antagonise the effects of an overdose of chloral, and *vice versâ*. Or in opium-poisoning it may be rational to give coffee, combined with blows on the palms of the hand and forced walking, to antagonise the narcotic effect until the poison is eliminated. But how seldom are these conditions paralleled in natural disease! On the contrary, rational pathology shows us that any relief from the whole tribe of narcotics, hypnotics, sedatives, pain-killers and stimulants of special nerves, can only be temporary and palliative (and that the more short-lived owing to the speedy exhaustion of their power by repetition),while the disease itself has no necessary tendency to cessation by elimination. In addition to this narcotics and pain-killers lull the physician as well as the patient into a fatal security, by stifling the symptoms and hiding the progress of the disease till too late for effectual remedy. Such treatment cannot be called rational by anyone acquainted with the true pathology of

disease. An exception must be made of general stimulants in certain fevers which have a more or less acute and definite course tending to natural recovery. Here, unless we can cut short the disease by some specific remedy, it must be admitted to be rational to keep life going by stimulants till the period of natural recovery arrives. The class of counter-irritants, revulsives and derivatives must also be pronounced rational inasmuch as they convey a reflex vasomotor and trophic nerve-stimulation to the diseased part, which may be truly curative. The objections are that these are themselves injurious to the part acted on, painful, and uncertain in their operation; but they cannot rationally be rejected unless superseded by better remedies, on the principle *melius remedium anceps quam nullum*. These better remedies we hope to find in the specific actions of medicines acting directly on the diseased part.

For these reasons, among many others that might be adduced, we must hold that a materia medica restricted to the classifiable actions of drugs is not commensurate either with the requirements of a sound pathology or with the evidence of clinical cures, for a vast number of these cannot be explained by such actions. We must therefore turn to the category, already large and constantly increasing in extent and importance, of exclusively pathogenic or disease-producing actions of drugs. Not, of course, that the classifiable actions, such as emetic, purgative, narcotic, &c., are intrinsically other than pathogenic; but there is a practical distinction not difficult to see, for these are circumscribed, producible and limitable at will, and often terminable by their very operation (as emesis and purgation are). On the other hand, the category in question is composed of pathogenic actions, local and general, which can only be described in the terms of special pathology of natural diseases. We have, for example, as pathogenic action of drugs: erythema, eruption, vesication and desquamation, inflammation, and finally gangrene of skin and external parts; boils, phlegmons, and abscesses; inflammation of all organs and parts of the body, gastritis, enteritis, peritonitis; numerous functional disorders of the primæ viæ and liver and pancreas; pains of all kinds, resembling rheumatism and neuralgia; and a variety of nervous phenomena. Who shall classify the epileptiform and tetaniform phenomena of poisoning by hydrocyanic acid; the dysæsthesia of aconite; the broncho-pneumonia of tartarised antimony; the anæmia of silver; the paralysis of arsenic; the fever and delirium of belladonna; the refrigeration of camphor; the catalepsy of Indian hemp; the tinnitus aurium of quinine; the colic of colocynth and lead, and such like? By what general title shall we designate the phenomena of iodism, hydrargyrosis, plumbism, and ergotism; the asthma of ipecacuanha; the myosis of opium and physostigma; the fatty degenerations and hæmorrhages of phosphorus; the pruritus of sulphur; the amaurosis of tobacco; the glycosuria of uranium; the cholera of white hellebore?

We have here a list of drug effects far surpassing in importance, extent, and variety the few classifiable actions of medicines consisting of a *plus* or *minus* activity of certain functions. These effects are also truly pathogenic, and cannot be described except in terms of special pathology, and are therefore specific diseases produced by the specific

power of the particular drug. Their number and variety is also limited only by our will to prove fresh drugs on the healthy body, and the number of such in the three kingdoms of nature is practically unlimited; whereas the number of the classifiable effects is necessarily narrowly limited, and that limit is very soon reached. A few good purgatives, emetics, narcotics, &c., are theoretically all that is necessary for the practitioner; and if, owing to the loss of power by repetition of all such medicines, more be desirable, still the number practically used by each practitioner is small, and any change beyond that is merely from fashion which substitutes a new thing for an old. What prospect does such a restricted materia medica give for an advance in therapeutics commensurate with the rapid progress of pathology which is now taking place? On the other hand, if the truly specific disease-producing power of drugs is taken into account as an essential part of the materia medica, what a boundless field in extent, variety, and power is at once opened up! But on one condition only, namely, we must know the connection existing, if any, between the specific pathogenic action of the drug on any part and its power of curing disease of that part: in short, the law of cure by the specific pathogenic powers of drugs, if such exists. Otherwise what boots it to us to know, for example, that ergot produces gangrene of the toes and fingers, and disease of the spinal cord, with cramps and paralysis? or cantharides inflammation of the bladder, if no practical application can be made of these facts except to shun the administration of these drugs in the respective diseases here mentioned? Before considering the nature and exact bearing of such a law of cure we must have a clear notion of the nature of the physiologically specific or pathogenic action of drugs.

All drugs are stimuli, *i.e.* agents which act in a manner distinct from chemically or physically on the living matter, exalting, depressing, or modifying its vital activity. Each drug, in virtue of its inherent nature, acts as a stimulus in a manner peculiar to itself, and distinct from all other substances in nature. Arsenic, for example, reacts with protoplasm or living matter in a manner quite as peculiar to itself as it does to the chemical tests of the laboratory, which demonstrate that it is arsenic and no other substance in nature. All drugs are therefore physiologically specific stimuli. On the other hand, the living matter possesses a corresponding susceptibility, which enables it to react with the various stimuli, natural and preternatural, to which it is exposed. This susceptibility varies as to quality in the same place, and more particularly as to seat in the different parts and organs of which our complex organism is built up. We have thus a specificity of seat and of quality in the power of drugs as stimuli. This specificity of seat and quality in the physiological action of drugs was first recognised by Hahnemann at once in its fullest and completest form, so that nothing has been added to his views in this respect down to the present time or probably can be added in the future. Hahnemann saw the fundamental error of John Brown in making his irritability or excitability single and everywhere the same; and by recognising the specific irritability of seat he has preserved what is true in the grand generali-

sation made by Brown,* as well as established his own principle, which now takes a foremost place in modern physiology. In Fletcher's *Physiology*, published in 1836, the principles of these two authorities are reconciled, and the doctrine of specificity of seat and of stimuli laid down. Every organ or part—it is said—down to the minutest anatomical divisions possesses its own peculiar or specific irritability, as a necessary property of the vitality inherent in itself, by which it can perceive and react with specific stimuli. Since that date the advance of the cellular and protoplasmic theories has overthrown the hypothesis of a central spiritual principle of life and recognised the inherent vitality of each organ and part, and the principle of the specificity of seat in the action of drugs is generally adopted into pharmacology under the term *elective affinity*. Of this we may enumerate some of the chief examples. Aconite, in Schroff's experiments, produced its peculiar neuralgia in the trigeminus only. Muscaria and atropia single out the inhibitory cardiac apparatus for special action, the former exciting, the latter depressing it. Aloes, in its purgative influence, affects the large intestine only. Tartar emetic inflames not only the gastro-intestinal mucous membrane which it reaches by actual contact, but also the bronchial lining and the pulmonary tissue. Arsenic, however introduced into the system, will set up gastritis, enteritis, and other similar inflammations. Atropia will dry the mouth and throat as surely when injected subcutaneously as when swallowed. Most (probably all) irritants are eliminated by the kidneys; but how few set up nephritis there, as cantharides and turpentine do! The deafness and tinnitus aurium caused by quinine and salicylic acid show a power on their part of affecting the internal ear which is almost unique. Conium and gelsemium choose the motor portion of the nervous system for the exertion of their paralysing influence, the sensory being unaffected; and the latter singles out the sixth nerve, among the others supplying the ocular muscles, for special depression. The rashes of copaiba and croton oil, when taken by the mouth, are well known. Nitro-glycerine and nitrite of amyl depress directly and immediately the vasomotor centre in the brain, leaving the rest of the nervous centres almost untouched. Those sensitive to iodide of potassium feel it peculiarly in the upper part of the respiratory mucous membrane; those readily mercurialised suffer first in the gums and salivary glands. Phosphorus inflames the periosteum as certainly in rabbits who are fed with it as in workmen with carious teeth who are exposed to its fumes. Podophyllin, when introduced into the abdominal cavity, leaves uninjured the peritoneum with which it comes in contact, but sets up

* We do not, of course, here allude to the therapeutic system of John Brown, which has everywhere fallen into the oblivion justly due to all partial and one-sided so-called systems of medicine. We allude to the principle that life does not consist in the spontaneous activity of any immaterial substance, but is an action between two factors, viz. the excitability of the living body and external agencies called stimuli. This is represented now in the simplest definition of life afforded by modern physiology, viz. "Life is the interaction of Protoplasm with the Environment." Without the co-operation of the environment, comprising pabulum, conditions and stimuli, protoplasm is incapable of manifesting a single vital action, and would speedily perish.

inflammation of the lining membrane of the small intestines. These are but a few of the examples of elective affinity in drug-action which pharmacology has to present.

We have thus abundant evidence of specificity of seat in the physiological and pathogenic action of drugs, hereby assimilating the progress of our knowledge of drugs with that of disease, in which localisation is, according to Virchow, the goal of modern medicine. Besides this there is the other element of physiological specificity laid down by Hahnemann, viz. kind or quality of action, and recognised by Trousseau in the expression *modificateurs* as applied to drugs. Physiological specificity therefore implies that drugs act more or less extensively on the living matter as specific stimuli and modifiers. Another principle to be here always kept in mind is that of the exhaustion which invariably follows all over-action from stimuli, whether natural or preternatural, and thus from all drugs; the effect being that a state of the living functions sets in just the opposite of that which obtained during the over-excitement of the living matter, as is shown in the well-known occurrence of fatigue and weakness after undue muscular exertion, drowsiness after over-wakefulness from coffee, constipation after purgation, &c. The same is also shown in the exhaustion of specific susceptibility on which depends the need of variety and increase of dose on repetition of certain drugs, and the law of immunity from a second attack of infectious diseases.

On these fundamental principles we are prepared to examine the relation between the physiological specificity of drugs in causing disease, and their therapeutic specificity which enables them to cure disease, and thus possibly to find a rational explanation of the latter. It might be expected that were physiology sufficiently advanced this might be arrived at *à priori* by the deductive method, but, be this as it may, it has already been sought (and we believe found) by the inductive method at a time when assuredly physiology did not afford the data to solve the problem by the deductive method. We have seen that by elective affinity drugs act upon certain organs and parts, but no one would imagine that that was all the knowledge we required to find the therapeutic specificity; that, for example, if we found a medicine to act on the heart or liver that was enough to enable us to cure any disease of these respectively with it. Even if we follow the elective affinity down to the minutest anatomical elements, whether secreting, muscular, vascular, or nervous, of which these complex organs are composed, we have still to face the question,—to which several possible physiological actions of the drug (*i.e. plus* or *minus,* or modifying) upon that element are we to look for the therapeutically specific action?

To answer this, Hahnemann took the truly scientific method of appeal to observation and experiment. He first noted a number of instances of cure by drugs not dependent on their indirect action as evacuants, counter-irritants, &c.; then he searched the records of medicine to find what was known of the action of those drugs on the healthy body, and he did find that they produced a very similar morbid state to the disease cured. He next reversed the process, and tried upon himself drugs of whose curative action nothing was known; then,

administering them in morbid states closely resembling those produced on the healthy, cure was again the result. These results being confirmed by a sufficient number of instances, he generalised them into the well-known therapeutic rule *similia similibus curentur*, and described by the term homœopathic the therapeutic action of the physiological-specific effects of drugs. Although Hahnemann attempted a hypothetical explanation of this therapeutic rule, he laid no stress on it, and was content to let the rule rest on experience alone as an inductive generalisation; parallel in fact to the law of gravitation, which is universally accepted as a fundamental principle in physics, although hardly any approach even plausible has been made towards the explanation of the mechanism of the phenomena described under the name of that law. In spite of the advance of physiology since Hahnemann's time we are still content to accept the homœopathic principle as an inductive law only, and decline to dwell on the explanations that may, many think probably, be given. For with the law alone nearly all the practical applications of it in medicine may be made; and, what more immediately concerns us here, the vast and visible change in the nature of a materia medica necessarily follows. With respect to the sufficiency of the proof of this law, we, in common with many thousands of medical men in this and the past generation, have examined Hahnemann's data and repeated his experience countless times, with the result of complete conviction of the truth of the existence of a homœopathic law of specific cure. Furthermore, we have never heard of any competent and unprejudiced observer who has seriously examined the question coming to a different conclusion. Of course opinions may vary as to its application, bearing on, and importance to general medicine, but these need not be gone into here, as our chief business is with the presentment of the materia medica in such a form as that the homœopathic principle can be readily applied in practice, as well as other rational methods of using drugs. We may, however, give the definition of the homœopathic principle which we think the best, and which in substance if not in words was greatly favoured by the late Prof. Henderson; viz., "Morbid states are cured by drugs which produce their *pathological simile* on the healthy body:" or "the specific-pathogenic (or physiologically-specific ?) effects of drugs are specifically curative of their *pathological simile* when occurring in disease." The advantage of this definition is that, at one stroke, it brushes away all the difficulties and ambiguities that have arisen when the similarity of symptoms was brought into the definition. The discovery of the *simile* in each case must obviously require exactly the same diagnostic elements as the discrimination of diseases. The *proximate cause* of any disease is the derangement or disorder of the protoplasm or living matter of the seat of it, and it is indicated by the structural changes and morbid products as well as the symptoms which are the consequence of this disordered action of the living matter; it is to the assemblage of these signs and symptoms that the name of the disease properly belongs. The proximate cause is the sole object of treatment by homœopathic specific medication, and we use the signs and symptoms of the drug-effects to discover the proximate cause among these which shall be similar to that of the

disease, and it is only when this correspondence is reached that relief of symptoms takes place. In the specific method we cannot treat symptoms; it is only in as far as the disease is cured that they can be relieved.

We must return to the question: which of the various actions still possible within the sphere of elective affinity is to constitute the pathological *simile* curative of the disease? Here we must now use theoretical or even hypothetical terms for the purpose of illustration, but we do not rest the truth of the specific law upon them. When by elective affinity a drug acts upon a tissue, part, or organ, it may act in one or more of five different ways: 1st as a modifier, 2nd as a primary excitant, 3rd as a primary depressant, and 4th and 5th as a secondary depressant or excitant; which correspond to the opposite states always following plus or minus vital action, and attributed by Hahnemann to reaction of the organism, but which we prefer to look upon with John Brown and Fletcher as the stage of exhaustion which follows all preternatural exaltation of vital action. There has certainly long been a difficulty in conceiving of a primary depressant action of a positive stimulus, and many have wished to refer the whole phenomenon to what it really is in many cases, viz., the secondary stage of a previous short stage of excitation. But the more recent discovery of the phenomena of inhibition and controlling power in the nervous system which, however difficult to explain, are unquestionably positive, implying exalted protoplasmic change in certain cells and centres, inclines us to the admission of primary depressants, whose action is also followed by the opposite state, which last may thus depend on an exhaustion after over-action. The first of these actions of specific stimuli, viz. as modifiers, presents no difficulty as to where the pathological *simile* to the disease is to be looked for. It is simply in the kind or quality of the modification of vital action itself, as indicated by all the signs and symptoms, none being rejected as primary or secondary, or opposite, because there is little or no *plus* or *minus* of degree. This is seen in the changes in the nutrition of the tissues, which is by far the most important and extensive field for disease, and for the need of specific remedies. Here the admission of a law founded on repeated experience alone, by which two similar morbid states mutually destroy or extinguish one another—just as two lights or two sounds whose vibrations are nearly related extinguish one another *—is sufficient to entitle to the term rational all specific cures by medicines whose physiological specific action is to produce similar modifications of nutrition. It is clear that here the dose must be so arranged as to produce no excess of action in the diseased part, and also that all collateral effects of the drug are superfluous. Upon this rests the definition of a specific suggested by one of us, viz., "A specific is a

* This is, of course, merely an analogy, for we believe that no vital act can consist in mere vibration, but that it implies a metabolic or vito-chemical change in the extremely complicated protoplasm or living matter. It is possible, however, that the vis nervosa which transmits stimuli may be a vibratory force in the white matter, though evolved by vital action in the grey matter, and thus certain phenomena of relief of pain, and possibly of inhibition, may be referred to interference.

medicine which cures disease by the absorption of its whole physiological into its therapeutic action." This first class comprehends all non-febrile and non-inflammatory disorders of nutrition, and the slower subacute effects of drugs continuously given in doses too small to excite their more obvious classifiable actions, and which represent a large part of the provings of the homœopathic school. The class of modifiers, whether as causers of natural disease or of specific effects of drugs, can hardly be said to be either excitants or depressants of protoplasmic (*i.e.* vital) action, but rather to pervert it and produce a degradation or degeneration of the living matter in the language of Beale, according to whom also all the existing bioplasts are the descendants of pre-existing ones and the parents of future ones, in health alike in power and capable of producing healthy tissue. But from the operation of various causes the healthy succession may be interrupted, and bioplasts are produced of a lower histological status, probably nearer the embryonal character, which are incapable of producing healthy tissue or secretions, though capable of increased reproduction of their own degenerated character, such as pus-corpuscles or other degraded though still living matters. Hence increase of production does not necessarily imply exalted vital action. Claude Bernard also compares ordinary nutrition to continued fissiparous generation of the living matter; and we can easily imagine how a disturbing agent by interrupting the healthy course may degrade the subsequent descendants. The desideratum in specific treatment is therefore a specific modifier, which shall regenerate the protoplasm and bring it back to its healthy course of reproduction. This is fulfilled by the specific modifier which can produce in health the pathological *simile* of the particular degeneration characteristic of any disease. The action of specific stimuli as modifiers is not confined to its own category alone, but interpenetrates and forms part of all the others, even the most transient functional disturbance in which *plus* or *minus* of vital action seems to constitute the whole process. In inflammation, for example, the degeneration of the bioplasts of the tissue, of the capillaries, or of the blood we think still constitutes the most important part, as it is also the only one specifically peculiar to the process, although the vascular disturbance is the cause of the *calor, rubor, tumor et dolor* which are the more striking factors as regards the system in general, and even locally, owing to the increased and stagnating blood supply, which reacts again on the degenerative protoplasmic changes, greatly aggravating them. It may be considered established by repeated experiment that the vascular disturbances in inflammation are caused by a primary stimulation and exalted action of the capillary arteries attended with constriction of them and consequent diminished blood supply, followed by a stage of exhaustion and weakness and consequent dilatation of the arterioles with increased blood supply, languid circulation, and finally stagnation of blood in the part. Upon this follows extravasation of serum and blood bioplasts, and overgrowth and degeneration of them and of the tissue bioplasts. These phenomena belong to a *plus* and *minus* of stimulation of the blood-vessels, and the state to which we must seek the pathological simile for homœopathic specific cure is that of secondary exhaustion following primary over-stimulation. Such a medicine,

acting on the part by elective affinity, given in small dose (so as to secure the primary stimulation only), must tend to bring back the capillaries to their healthy calibre, and thus remove the palpable signs of inflammation. But if acting too strongly it must bring on further exhaustion of the capillary arteries and aggravate all the phenomena. As a matter of fact this is what takes place experimentally by topical stimulation, for a moderate application of some other stimulant, and even of the same, will remove the redness and stagnation produced by previous excess of stimulation, while strong and prolonged repetition will aggravate it to an incurable degree. Counter-irritants, according to the theory set forth in Fletcher's *Pathology* in 1842, act in an analogous manner, viz. by reflex stimulation from the blistered part causing contraction of the weakened capillaries of the inflamed part. It is probable also that the so-called "substitutive method" of Trousseau consists mainly in the primary stimulation of the capillaries by the more general elective affinity of the drug to the inflamed part. In all these instances there is not the close and peculiar similarity between the curative agency and the morbid state which we desire in a true and complete specific: it hardly goes beyond specificity of seat or elective affinity, and it is correspondingly uncertain, imperfect, and having liability to relapse. However, we do not agree with those pathologists who would put the vascular and almost mechanical phenomena of inflammation completely in the foreground as the fundamental, primary, and almost exclusive cause of the process. On the contrary we agree with those who look upon the modification or perversion of the vital action of the tissue bioplasts as not only the most specifically peculiar and important, but also probably in all cases the initial step in the causation of inflammation, and the vascular disturbance as consequent and induced by the action of the local vasomotor centres which govern the calibre of the capillary arteries in obedience to the degree of protoplasmic activity. We see, for example, infective poisons, which are carried at once to the tissue bioplasts, speedily produce also all the vascular phenomena of inflammation: whereas changes in the capillary circulation induced by the spinal vasomotor centres produce various flushings, blushings, hyperæmias and congestions, but not true inflammation. In the case of inflammation produced in a remote part by sympathy the reflex action is not necessarily due entirely to the spinal vasomotor nerves, but more probably the greater part is by filaments forming the nerves of organic sympathy (possibly the same as trophic filaments) acting on the tissue-bioplasts primarily, and in consequence of the irritation thus produced, the vascular disturbance takes place through the local vasomotor centres. The specific remedy must therefore correspond as *simile* in the first place to the specific character of the altered protoplasmic action of the part, induced not only by the occasional exciting cause, but also, in many instances, by a long train of past predisposing causes; and in the second place to the secondarily weakened state of the capillary vessels. The therapeutic action of a homœopathic specific remedy in inflammation is therefore obviously that of a modifier, restoring to health, or regenerating the living matter in the main part of the diseased process; and even in the vascular part

the action is probably similar on the paretic local vasomotor centres, or on the living matter of the muscular fibres, rather than a mere stimulation. The extremely minute dose of the truly homœopathic specific or *simillimum* capable of speedily relieving the vascular as well as the other disturbance is in favour of this latter view.

The same principles apply to fever as to inflammation, and thus a large part of the field of pathology is already covered to which the therapeutic law of similars can be rationally applied. There remain to be considered those actions and functions in which the *plus* and *minus* of vital action is the essential phenomenon, and in which the one state is always succeeded by the opposite state: for example, evacuants and narcotics, and the functions which depend on the balanced action of a very complicated system of nerves, such as those of the heart, the bladder, &c. In these cases it is essential to know to which of the opposite states the physiological specific action should be similar in order to become the therapeutic specific. For example, a purgative produces as its primary effect an increased action of the enteric secreting cells, or diarrhœa, followed by the corresponding exhaustion or diminished action of the same organs, or constipation. Now, both these opposite states (as regards *plus* and *minus*) are consequent on the administration of the drug, but the similarity required to constitute therapeutic specificity belongs to the primary action alone. It is therefore imperatively necessary in the arrangement of the materia medica that the whole group should be given entire, that we may distinguish the primary symptoms indicative of the curative specific action from the comparatively worthless secondary symptoms. The necessity for this distinction runs through all the categories of drug action where *plus* and *minus* of action and function are the main factors. The reason why purgatives cannot be specifically and permanently curative of idiopathic constipation is sufficiently obvious. In it the secreting cells, nerve and muscular fibres of the intestine are so far diseased that they fail to respond to the natural stimuli; but an extraneous more powerful stimulus, such as a purgative drug, may rouse them to renewed action, which, however, is only temporary, and still further exhausts the weakened vitality of the part, compelling resort to larger doses and variation of the purgatives indefinitely, without hope of cure. On the other hand, it is not at all obvious why a purgative in small doses should ever stop the over-action of the bowels. The physiological mechanism of the action of evacuants is extremely complicated, and far from being as yet fully understood; so we shall not attempt to explain the homœopathic specific action here, but we may endeavour to remove some misconceptions of its nature, and make the sphere of it intelligible. It is not asserted that a purgative in any small dose has the power of stopping a natural secretion, even when increased within physiological limits; it is not an astringent in a small dose, as has been incorrectly maintained. In various diseases more or less copious discharges from the bowels occur, from irritating matter being poured into them, or from reflex irritation from diseased organs, or from the state of the blood, the action of the bowel itself in such case not being morbid, but natural, and the result often critical and wholesome to the economy at

large. In such cases the homœopathic specific action of purgatives has no place, and they cannot in any dose stop or suppress such discharges. Here as elsewhere we cannot (fortunately) treat symptoms by the homœopathic specific method. But when the bowel itself is involved idiopathically, and is thus in a state of disease, the case is altered. There is now a modified, perverted, or degraded state of the secreting nerve or muscular protoplasm to be dealt with; and the pathological state becomes assimilated to that of inflammation, in which the vascular dilatation is passive, and the perverted protoplasmic action requires for cure in the first place a specific modifier capable of producing a similar perverted action. A small dose of a purgative fulfils this indication, and as a consequence of the restored health the excessive and perverted discharge stops and the vascular disturbance subsides. The drug here does not act as an astringent physiologically, for it is only in virtue of neutralising pre-existing disease that it has any power of stopping secretion. That in idiopathic diarrhœa we have to deal with a morbid state belonging to the category of inflammatory diseases is shown by the fact that some of the best homœopathic remedies for it, such as arsenic and corrosive sublimate, are not purgatives, but irritant poisons. A cure of muco-enteritis and its prominent symptom diarrhœa by a small dose of one of these is obviously a cure by a drug which produces its pathological simile:—this cannot be gainsaid. The same applies to purgatives, although their action seems to be limited to a mere increase of a natural secretion as their full physiological action. But it is not really so, for all or nearly all of the purgatives, even the mildest, become irritant poisons in excessive doses. So the difference is only in degree, and the similarity required in an apparently merely increased natural secretion is of the same nature as that in a truly pathological state like inflammation.

In the case of astringents and narcotics, it is to the primary action of the drug that the similarity must obtain in order to get the therapeutic-specific action of drugs. In idiopathic inaction of the colon, for example, not dependent on defect of the remote stimulus conveyed by reflex action, nor by that of the contents, as above said, the antagonistic action of purgatives is useless, but we must look to the similarly acting medicines, such as opium, alum, belladonna, zinc, nux vomica, plumbum, &c., to neutralise the morbid state of the local nerve-centres, the secreting protoplasm, the muscular fibres, or the mucous and epithelial protoplasm. The art of the physician is to make the differential diagnosis among the various drugs whose pathogenic symptoms correspond to these states; and to enable him to do so a most minute description of these must be given in the materia medica in the order of occurrence, so that the primary can be distinguished from the secondary symptoms. In respect to narcotics also we will not attempt an explanation of the specific curative sphere of their action according to the law of similars. The physiology of their action is still incomplete, and it is certainly very complicated; but enough is known to make us refuse to admit it to consist in a *plus* or *minus* contraction of the capillaries of the grey matter of brain or nerve. Vulpian's experiments show that there is a direct action on the grey

matter itself, independent of vascular changes: and that action in producing sleep is a positive one—an over-action of the sleep-function, and therefore followed by a corresponding exhaustion, attended with the opposite state of wakefulness. The homœopathic specific curative sphere is in the first of these, and not in the latter, where it can only be a temporary palliative; so in this class also the materia medica must set forth the complete picture of the symptoms in their natural sequence.

We think it obvious, moreover, that unconsciousness forced upon the brain by narcotics is something altogether different from natural sleep, and answers rather to soporose conditions occurring in disease. Selection by similarity, therefore, supposing it to be legitimate, lays hold here of a relation much closer and more real than when we work by antagonism. To effect it, however, it is not sufficient to say that a given drug is hypnotic. We must know the kind of slumber it causes, which is quite distinct in the case of opium, henbane, chloral, and the bromides, that we may fit the drug-action to corresponding idiopathic morbid states.

Our last example was a complex function like the action of the heart. We have here neither a secretion, nor a process susceptible only of a *plus* and *minus*, but one dependent for its integrity on a balance of nervous and muscular influence. The cardiac muscle has its own independent vitality and capability of responding to stimuli; for when the lower two thirds of the ventricles, which contain no ganglia, are severed from their bases, though they do not pulsate automatically, they do so on being excited from without. By the ganglia, spontaneous activity of the organ is provided for. We have then the vagi (or rather the spinal accessory fibres running in the vagi), which inhibit the heart's action, and the accelerator nerves, which quicken it. Any drug influence on the heart must be the result of action on one or more of these factors. Now, the study which our lamented colleague, Dr. Black, has given in the following pages to the cardiac effects of digitalis shows how extremely difficult it is to analyse drug-action here. A few facts we have ascertained, as the paralysing action on the inhibitory nerves of atropia, and their excitation by muscaria: but how small is the result compared with the time expended and the animal life and happiness sacrificed! Such knowledge must be registered, and may be turned to account, palliatively, by the way of antagonism. But how much more fruitful is the method which seizes on the *tout ensemble* of cardiac phenomena ascertained by drug experimentation, and applies it to disease according to the law of similars! We are delivered thereby from the peril of false hypotheses. When the heart, poisoned by digitalis, was found to be in systole, behold, said the pharmacologists, a stimulant action exerted on the organ; let us give it, said the therapeutists, as a cardiac tonic. But then came Claude Bernard to show them that this contracted heart was a dead one—its systole being the rigor mortis; so that by trying to whip up a weak heart by large doses of the drug they were actually lowering its vitality and imperilling their patients' lives. The homœopathic principle is independent of such

theories ; it belongs (as one of us has constantly maintained) to medicine as an art, not as an applied science. It takes into account all facts, both obvious and recondite, but facts only ; and from these infers what its remedies can do. Just as truly as the method by antagonism, it requires the knowledge of the physiological action of the drugs it uses ; but far more thoroughly must it know them to apply its knowledge aright. Once more then do we see the need of such a materia medica as that which, for the medicines included in this volume, we have endeavoured to supply.

Finally, there is another field where the homœopathic specific action must play a large part, in fact we may say the whole part, *i.e.* the prophylaxis of specific diseases. The remarkable immunity from a second attack which characterises the specific eruptive fevers is well known, and is accounted for by the exhaustion of susceptibility which follows more or less the action of all stimuli, showing itself in its most complete form in those diseases which depend on a poison—the offspring as well as the cause of the disease itself. And not only the disease-poison itself produces this immunity ; other poisons of a similar nature can produce the same effect, as is witnessed in the notable instance of the vaccine virus, which there is strong reason to believe is the same poison modified by transmission through the horse and cow or only the latter. Any way its pathological action is extremely similar, though weaker in intensity and slightly altered in kind. That a prophylactic agent should be very similar to the poison whose disease it prevents stands so to reason and common sense that we cannot imagine anyone holding an opposite opinion. Besides the extension of the principle of prophylaxis among other infective diseases by morbid poisons, some drugs are known to have the same powers, such as belladonna in certain forms of scarlet fever to which its pathogenic effects are similar, quinine and arsenic against certain malarious fevers to which their action on the healthy body is similar ; for here germicide powers can hardly be in question seeing that the dose is far below what is necessary for that purpose. In addition to these there is reason to believe that the principle of immunity may play an important part in the homœopathic-specific cure of specific diseases. How is it that a patient affected with a disease in which the specific poison is perpetually being multiplied, ever can recover ? How is it that a patient made ill by an infinitesimal dose of a morbid poison lives and becomes convalescent at the very time when the poison is present in him in such quantity that he is a source of pestilence to all around ? Obviously because the susceptibility to the action of the specific poison is being exhausted, and immunity setting in, *pari passu* with the progress of the disease. So in the cure of specific diseases by specific drugs may not the same principle be at work ? We think it probable that in the cure of syphilis by mercury or chrome this is the rationale of the prevention of secondary symptoms by the exhibition of the remedies during the primary stage : viz. the stage of immunity is hurried on by the similarly acting drug, so that the secondary symptoms only appear in a rudimentary and imperceptible form. We think it also probable that the production of immunity from various causes of disease may play an

important part in the cure of many diseases by specific drugs. And if so, it is plain such specifics must be similars.

The foregoing considerations show that there is and must always have been a large field for the display of the homœopathic specific principle in therapeutics, whether that principle was recognised by the prescriber or not; and this must be shown chiefly in the empirical uses of them derived solely from clinical experience. Hahnemann collected a large number of such instances from the medical writers before his time, and it would be instructive to trace the changes in medical practice in general which have been brought about by the discovery of specifics through the homœopathic principle, but adopted as empirical remedies by those who ignored their source.*

From these theoretical and practical considerations it is plain that the homœopathic principle is a fact that must be reckoned with in dealing with the materia medica, and that no one ignorant of it or ignoring it can be capable of giving a true and complete account of the materia medica of the present day. Exclusive dogmatists have no place among men of true science.

In a complete materia medica it is necessary to give the scientific as well as the popular names and synonyms of each substance, and the bibliography and sources of information. The following particulars should also be given, viz. of *Animal* and *Vegetable* substances, something

* The following are some of the most prominent examples of the empirical adoption of our remedies by the ordinary practitioners:—

Aconite in fever and inflammation (Liston, Ringer), in pneumonia (Dobie, Rabagliati), in neuralgia (Laborde, Gubler); arsenic in cholera (Black, Ringer), in gastralgia (Ringer), in neuralgia (Anstie), in diarrhœa (Ringer), in coryza (Ringer), in pernicious anæmia (Bramwell); amyl nitrite in flushings (Ringer); belladonna in sorethroat (Thompson, Handfield Jones), in headache (Ringer), in erysipelas (Lister, Ringer); hepar sulphuris in abscesses and boils (Ringer and others); cantharis in cystitis (Ringer), in Bright's disease (Ringer); copper in cholera (Burq, Ringer); drosera in whooping-cough (Murrell); glonoine in headache (Field), iodide of potassium in coryza (Ringer); ipecacuanha in sickness and vomiting (Fuller) of pregnancy (Ringer); mercuric chloride in dysentery (Ringer); pulsatilla in dysmenorrhœa (Brunton, Routh); sabina in metrorrhagia (Zinkhan, Ringer); terebinth in Bright's disease (Ringer); veratrum album in diarrhœa (Ringer); carbolic acid in vomiting (H. C. Wood); fluoric acid in goitre (Murrell); tartar emetic in pneumonia (Williams); euphrasia in coryza (Piffard); copaiba in urticaria (Piffard); chrome in syphilis (Bonnefoux, Güntz).

One of the most striking instances of the extent of the empirical adoption of homœopathic specific remedies was given some years ago by the circular of the *Practitioner* to all medical men in this country, requesting a description of their ordinary treatment of common cynanche tonsillaris. In the answers a very large proportion reported the use of small doses of belladonna! This is plainly and palpably homœopathic, for it is simply giving a small dose of a drug capable of producing the very inflammation in question, and was recommended long before for that very reason by Hahnemann. How far the practitioners were aware of the source of the knowledge they were putting in practice does not appear from the published matter, but the editor seems to have thought himself bound to explain that notwithstanding appearances this coincidence gave no support to the homœopathic principle of specifics. This he did in a sophistical style that gives us an excellent idea how the Galenists must have dealt with the troublesome facts urged by Harvey. They were his prototypes of the seventeenth century: *Malo cum Galeno errare quam cum Harveio circulare!*

of the natural history, with the distinguishing characters of the class, family, genus, species, and perhaps variety; and the habitat, means of procuring, proper time for and manner of collecting and preserving, as well as the parts to be used as drugs and medicines; along with their physical characters, composition, and constituents; with the characters of the genuine article and of any spurious substitute and imitation. Of *Mineral* substances, something of the chemical history, with the physical and chemical characters, composition, and constituents of the genuine article and of any spurious substitute and adulteration.

Also something of the pharmacy, and the different preparations, with their characters and the manner of preparing and preserving them, with the best vehicle for their preservation and use.

To each of the above divisions there should also be furnished some account of their physical, and of any chemical effects they are capable of producing on the animal body, with the mode of introduction or use externally and internally; with their antidotes—chemical, physiological, and medicinal; as well as any chemical uses, such as antidotal, absorbent, escharotic, caustic, anthelmintic, germicide, disinfectant, deodorant, &c.

More particularly and more fully, however, should be displayed their physiological or pathogenic actions as vital stimuli; and these should be so arranged as to show at once any possible therapeutic uses to be founded on the classifiable actions, such as astringent, cathartic, diaphoretic, diuretic, emetic, epispastic, errhine, narcotic, sedative, &c.; with the quantities or doses necessary for the production of these different kinds of action. This department of the subject is, however, already sufficiently recognised in ordinary works on materia medica, which in fact consist of scarcely anything else.

After this there still remains the larger and far more important department, viz. those physiological or pathogenic effects which more nearly resemble disease itself. These are contained in two sources, viz. poisonings, and purposive experimental researches made upon healthy living beings. How to arrange these so as to render them intelligible and accessible to the practitioner guided by the homœopathic law is a difficult problem (and one in which the ordinary works hitherto passing as materia medicas give us no help), for instead of the simply classifiable actions above alluded to, we have to deal with an enormous mass of experimental facts apparently unconnected, and to whose pathological significance we have often little or no clue. It is obvious that here summaries and theoretical generalisations are out of the question, as they can never supply the place of the minute details; for if the pathological similitude between the disease and the effects of drugs is the object of search, that correspondence must possess a degree of exactness which can only be attained by a comparison of minute details. It is thus impossible to escape the difficulty laid upon us by the voluminous collections of apparently redundant and often seemingly trivial symptoms, such as are yielded in the course of experimentation on healthy persons with moderately small doses, even after the most stringent sifting of these details. The rejection of symptoms which appear to be trivial requires the greatest caution and discrimination,

for in the progress of pathology towards perfection it is found that grave diseases are often indicated in their early stage—the only one of importance for the cure—by symptoms which might have been looked upon as trivial or even ridiculous, *e.g.* the tendon reflex of incipient locomotor ataxy, and the transient vertigo, drowsiness, dimness of sight, deafness, and tingling in extremities of incipient apoplexy, &c., &c.

No plan of arrangement can be admitted which will in any way disturb the natural order and connection of the symptoms. Hence it is necessary to arrange the symptoms exactly as they occurred, and to add a guide to them in the form of some suitable index. These conditions may be met in various ways, as shown in the medicines contained in the present volume.

The difficulties of carrying out the above desiderata are very great in practice; but we may be assisted by keeping in mind the following considerations:—In a general view of the effects of drugs we perceive that they divide themselves roughly into two great classes, viz. first, those which are producible at will upon all persons, if the dose is sufficient; to this class was given the name *genico-dynamic* by Dr. Madden and *absolute* by one of us: and secondly, those effects which are not capable of being produced at will, but which are contingent on the presence of a special susceptibility in the subject of experiment; to this class the name of *contingent* has been appropriately given by Professsor Imbert Gourbeyre. The absolute class corresponds broadly with the toxic and large-dose effects of drugs; and these may be simply written down under the headings of the organ or part to which they belong, in full detail, in the exact order of their occurrence, taking care that the sympathetic and subordinate symptoms be not detached from the original narrative. The individual symptoms forming these groups can then easily be rendered accessible by a proper index. Were these all the effects of drugs their arrangement would not be difficult, seeing that the connection between the subordinate or sympathetic symptoms and those of the main group is obvious enough; but with the contingent class it is widely different, for here the symptoms appear singly, or in small or large groups in widely different organs, and apparently unconnected, without any indication of the internal nexus of the pathological states which lie at the root of them. This difficulty has been met in various ways in the present volume; some of the authors following the plan of Hahnemann, which is simply to detach the symptoms and arrange them under the organ in which they occurred. Others have endeavoured to retain them in their natural connections as in the provings, even though that connection consisted simply in the fact that they occurred in the same person; for example, in the presentation of Kali bichromicum as a rule all the symptoms in a particular paragraph occurred in the same person and constituted the whole of the morbid phenomena present at the time. These paragraphs are formed by any number of symptoms, even down to one; independently of which the prover was supposed to be in ordinary health. These groups are rendered accessible by an index in the same way as the absolute groups.

To the above-described presentations of the effects of drugs should

be added a theoretical commentary at the end of each section, including remarks upon the pathological appearances, if any, and indicating as well the probable homœopathic specific therapeutic application of the particular medicine; and this should be followed by clinical confirmations, as shown in the present volume.

But these commentaries, however full, can never be accepted as a substitute for the narrative of the actual symptoms. For how, except by a faithful narrative of the actual symptoms, can any reporter convey to others information of greater value than he is himself aware of, as a telegraph clerk does when he transmits a cypher? Granting that the writer of the commentary united in his own person the sum of all the knowledge of the day on pathology, and described the pathological significance of the symptoms in the most complete manner the science of the day allowed, without the actual narrative of the symptoms, yet, still, what is that? In the course of a few years all will be changed, and the description then deemed so perfect will have become antiquated and unintelligible. But yet the effects of drugs on the body are immutable and always the same, and a plain and faithful description of them can never become antiquated or otherwise than correct.

We thus present to the profession the drugs embraced in the present volume: several more being ready, which can form a second if it is called for. We trust that no one will be prejudiced against its examination by the avowed standpoint of its authors. We ask that our work may be judged first of all upon its merits, and secondly only in its reflex bearing on the question of the truth of homœopathy—a fruit of whose tree it is. This is surely the mode of proceeding to which science constrains its disciples. To our colleagues of like therapeutic faith with ourselves we commend these monographs on medicines as studies which may tend yet further to elucidate their virtues, and arrangements which may make their symptomatology more available for practice.

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August, 1884.

ACONITUM.

BY

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ACONITUM NAPELLUS.

Synonyms.

Aconitum cæruleum, Tora, Tura, Thora, Taura (Dodonæus, *Stirp. Hist. Pempt.*, iii, lib. iv, c. 12, p. 438, Antwerp, 1583). A. vulgare (Decandolle), Superbia (Gesner, *Hist. Animal de Lupo*). Lupi radix, Luparia (Baubinus, *Hist. Plant.*). In English: Wolfsbane, Chokepard, Monkshood, Blue Rocket, Helmet flower. In French: Napel, Aconit, Tueloup, Cappe or Capuce de moine, Char de Venus. In Italian: Napello. In German: Sturmhut, Eisenhut, Sonnenhut, Mönchskappe, Narrenkappe, blaue Wolfswurzel. In Flemish: Wolfwortele, Motrinex-cappen. In Swedish: Stormhatt.

Botanical Characters.

Natural order *Ranunculaceæ*, Juss.; *Polyandria trigynia*, Linn. Well illustrated in Hamilton's *Flora Homœopathica*.

It is supposed by Bergius that the experiments of Störck which Hahnemann has incorporated in his schema were made with the *Acon. cammarum*, as that is the most frequent in the neighbourhood of Vienna, but Endlicher contends they were made with the Acon. napellus. There does not, however, seem to be much, if any, difference between the medicinal properties of the two species. The A. cammarum is the same as A. paniculatum of Decandolle, who admits no less than twenty-nine varieties.

This plant is occasionally met with wild in some parts of England (Herefordshire and Somerset), but is a doubtful native. Its chief localities are the mountainous districts of Switzerland, the Tyrol, Bavaria and Sweden.

Flowering time.—June to August. *Parts employed.*—The leaves and flowering tops, and the root.

Characters.—*Leaves* smooth, palmate, divided into five or seven deeply-cut wedge-shaped segments, exciting slowly when chewed a sensation of tingling. *Flowers* numerous, irregular, deep blue, in dense racemes. The upper helmet-shaped sepal at first conceals the lateral ones, but is ultimately thrown back. *Carpels* 3, often slightly united at the base. The fresh *root* is usually from one to three inches long, tapering, dark brown, internally whitish. A minute portion cautiously chewed causes prolonged tingling and numbness. As this numbness is considered a measure of the activity of the plant, and is most intense in the root, next in the seeds, next in the leaves before the flowers blow, it would secure a surer preparation if the fresh root were alone employed in making the tincture. Geiger first ascertained, and Christison confirms the observation, that the numb sensation occa-

sioned by the leaves diminishes in intensity as the flowers expand, and almost disappears when the seeds ripen (Christison, p. 867).

Time for collecting.—The leaves and flowering tops just before the flowers have expanded. The root in spring, before the leaves have appeared.

The cultivated plant has been repeatedly used in place of the wild one, and it yields a very good tincture. It is needful, however, to select plants which have not been grown in rich luxuriant soil, and also such as retain all the characters of the wild plant unaltered by cultivation. It is noteworthy that many aconites in this climate are inert.

Chemistry.

Brandes and Peschier first announced the presence in aconite of an alkaloid which they called aconitina. It is one of the most virulent and rapidly-acting poisons, so powerful that the fiftieth part of a grain has endangered life (Pereira, ii, p. 1811).

It is contained in all parts of the plant, but especially in the root. It is a white or whitish-yellow semicrystalline substance, somewhat resembling manna. It is soluble in alcohol and ether, but scarcely soluble in water, even when boiling; it is dissolved by acids (acetic), forming crystallisable salts. Nitric acid dissolves aconitina without imparting to it any colour, in which respect it resembles picrotoxin.

Sulphuric acid produces with it no change of colour in the cold, but turns it of a dark brown tint when heat is applied. It is too active a poison to subject it to the test of taste. No reliable chemical tests are known.

A fatty oil can be extracted from the root by alcohol. It possesses a powerfully benumbing property. The juice of aconite also contains a volatile acrid principle, which requires considerable nicety of manipulation to extract. In the evaporation of the juice octohedral scales of aconitate of lime are frequently deposited. From these aconitic acid is obtained.

According to Flückiger and Hanbury (*Pharmacographia*) the aconite plant contains the following alkaloids: aconitine, pseudaconitine, aconine, pseudaconine, and picraconitine. Commercial aconitine is, they say, a mixture of all these alkaloids. The French and German aconitines differ greatly in strength; the former is crystalline, the latter amorphous. The aconitine of Morson, also amorphous, is stronger than either, and is supposed to be made from the *A. ferox*, as it agrees with Schroff's account of the pathogenetic effects of that species in causing dyspnœa, but not facial neuralgia.

Pharmaceutic Preparations and Dose.

The *inspissated juice* or *extract of aconite* is an uncertain preparation, inferior to the alcoholic extract made by distilling the spirit from the tincture until the consistence of an extract has been obtained. It possesses no advantage over the tincture except when it is desirable to use it externally in the shape of ointment. The dose of the ordinary pharmacopœia is about one sixth of a grain every three hours.

The *tincture* of the *British Pharmacopœia* is directed to be made thus:—Take of aconite root, in coarse powder, 2½ oz.; rectified spirit 1 pint. Macerate the root for forty-eight hours in 15 oz. of the spirit in a closed vessel, agitating occasionally; then transfer to a percolator, and when the fluid ceases to pass continue the percolation with the remaining 5 oz. of spirit. Afterwards subject the contents of the percolator to pressure, filter the product, mix the liquids, and add sufficient rectified spirit to make one pint. Dose, 5 to 15 minims.

The *tincture* of the *British Homœopathic Pharmacopœia* is made from freshly-collected leaves and flowering tops, and from the fresh and dry root, proof spirit being used in either case. A strong tincture may be made from the dry root, using rectified spirit. Every 10 oz. of the tincture represents 1 oz. of dry aconite. The tincture of the British Pharmacopœia is stronger, 8 oz. representing 1 oz. of the dried root.

Hahnemann directs the tincture to be made with equal parts of the expressed juice of the whole plant (including, of course, leaves, flowers, stem, and root) and alcohol (strength not stated). It might be as well to adopt the tincture of the root only as in the British Pharmacopœia, only altering it, by the addition of alcohol, to the strength of the British Homœopathic Pharmacopœia.

Aconitina exists in the plant in combination with an acid, and is made from the alcoholic extract by the addition of sulphuric acid, when a sulphate of aconitina is formed, which is decomposed by ammonia, and the aconitina precipitated. There are difficulties in the preparation. A spurious aconitina is found in the shops; Morson's is that most used in England. Headland gives a warning against the enormous doses of aconitine said to have been given by Schroff and Von Praag in Germany—·02—·05 gramme, or ⅓—¾ of a grain. If the alkaloid were pure such a dose would certainly cause death (*Action of Medicines*, 1868, p. 435). Its internal use, unless in the form of a highly-diluted solution, is dangerous. Turnbull, who recommended its external application, but had from dangerons experience abandoned its internal use, employed two preparations, an ointment containing gr. xvi to the ℥j, and a solution, gr. viii to rectified spirit ℥ij. These are not to be employed when the skin is abraded.

History.

The derivation of the word Aconitum or *ἀκόνιτον* is involved in some degree of uncertainty. According to Theophrastus, Nicander, and some others it is derived from *Ἀκόναι*, a place near Heraclea, where Hercules descended to the infernal regions, and where the plant abounded, produced, as Ovid says, by the foam scattered about by the dog Cerberus when brought up on earth. "Acone, portus est Bithyniæ, qui pro ventu malorum graminum, usque adeo celebris est, ut noxiam herbam *aconita* illinc nominemus."—*Isidorus, Origin.*, lbi. xvii, cap. 9. Others derive it from *ἀκόνη*, a stone, or properly a whet stone, either because the plant affects stony localities,

> "Quæ quia nascuntur dura vivacia caute
> Agrestes *aconita* vocant."—*Ovid's Metamorph.*

or because it was found chiefly beside that kind of stone used for sharpening tools.

It is also said to be derived from ἀ, privitive, and κονις, dust, likewise in allusion to its growing amongst rocks where there is but little soil.

The name *napellus* is derived from *napus*, a turnip, its root having some resemblance to a small turnip.

This plant was known to the ancients, and is mentioned by Nicander, Dioscorides, Theophrastus, Galen, Paulus Ægineta, and others. It is also referred to in mythological history as a poison of great power, but many poisonous plants were confounded by old writers under the name of aconitum. In fact, the name seems sometimes to have been used for poisons in general, as in this passage from Juvenal:

"Nulla *aconita* bibuntur fictilibus."

Dioscorides describes two kinds of aconite, the first, of which Gesner treats, has been the subject of much difference of opinion, and remains undetermined; the second is, with little doubt, *A. napellus*. It is asserted that huntsmen dipped their arrows into the juice of this plant when hunting wolves; hence the name of *wolfsbane*.

Its poisonous properties seem to have been well known to Shakspeare, who says:

"Though it do work as strong
As *aconitum*, or rash gunpowder."—(2 *Hen. IV*, iv, 4.)

Dryden also mentions it:

"Our land is from the rage of tigers freed,
Nor nourishes the lion's angry seed;
Nor poisonous *aconite* is here produced,
Or grows unknown, or is, when known, refused."

And Granville:

"Despair, that *aconite* does prove,
And certain death to others' love."

The dried roots of all the Indian species, viz. *A. ferox*, *napellus*, *palmatum*, *luridum*, are sold in the Indian bazaars under the name of *bikh* or *bish*, from the Sanskrit, *visha*. The Hindoo *bikh* or *bish* is also the generic word for *poison*. In Madras the aconite root is called *nabhi*, an abbreviation of *vasanabhi*, which represents *vatsanabha* (calf's navel), the Sanscrit name of this plant. I am indebted to my learned friend Colonel Yule for this information.

It was used by the ancients principally as an external application to relieve pain, but the employment of this drug fell into disuse until 1762, when prominence was given to it by Störck, who praised its powers as an antispasmodic, as a stimulant to the absorbents, as diuretic and diaphoretic. Many of his statements are, no doubt, exaggerated and unscientifically reported, still to him is the merit of showing that this plant may be used not only with safety, but with advantage. It then took its place in the pharmacopœias, and has since steadily gained the position of one of the most useful of remedies.

In 1796 Hahnemann, in a paper in *Hufeland's Journal*, described, the well-known poisonous action of aconite on the human body. He gave a fuller account of its effects in his *Fragmenta de viribus medicamentorum positivis*, and still further enriched the pathogenesis in his *Reine Arzneimittellehre*, 1811. About this same date Sir B. Brodie was the first in England to examine into its effects on animals, showing that it excited staggering, excessive weakness, slow laborious respiration, and slight convulsive twitches before death (*Phil. Trans.*, 1811, p. 183). Then later Orfila took up the work, finding that aconite is absorbed and carried into the circulation, that it acts specially on the nervous system, principally on the brain, determining a peculiar mental alienation; that it excites local irritation capable of being developed into more or less intense inflammation; that it appears to act on human beings similarly to dogs; that probably aconitine is the active principle (*Toxicologie*, ii, 362).

But the results of these two observers are poor compared with the full pathogenetic picture of aconite drawn by Hahnemann in 1796. In 1836 Christison was convinced by a single experiment that Orfila's views were incorrect, and he observes that the symptoms of poisoning depend in a great measure on gradually-increasing paralysis of the muscles, which terminates in immobility of the chest and diaphragm, and consequent asphyxia (Christison, *On Poisons*, p. 869). Pereira in 1842 published some experiments with an alcoholic extract, showing two remarkable phenomena—an extraordinary diminution of common sensation, evidenced by the animal being insensible to pinching and pricking, and the total absence of stupor, as shown by the animal following its owner, and recognising him when called.

In 1845 appeared the inaugural thesis of Fleming, which is the fullest English monograph on the subject. He found that the most remarkable symptoms are weakness and staggering, gradually-increasing paralysis of the voluntary muscles, slowly-increasing insensibility of the surface, more or less blindness, great languor of the pulse, and convulsive twitches before death. He observed that the pupil becomes much contracted, that the irritability of the voluntary muscles is impaired. He maintains that the poison has no irritant properties, that it occasions no vascularity in any membrane to which it is applied, even, for example, in the lip or tongue while burning and tingling from its topical action, and that this is therefore merely a nervous phenomenon; that he never could observe the diffuse cellular inflammation described by Orfila from the application of aconite to a wound, or the inflammatory redness of the alimentary canal noticed by others.

The provings of the Austrian Homœopathic Society, arranged by Gerstel, and published in the first vol. of the *Oest. Zeitsch. für Hom.*, added greatly to our knowledge of the physiological action of aconite, and several other provings by physicians of both schools have appeared since Hahnemann's; they will be found detailed further on.

In 1858 Reil's prize essay on aconite was published, and is an excellent monograph. There is an English translation of it by Millard.

Carrol Dunham and Imbert Gourbeyre have enriched our literature with excellent articles on aconite, and the account given by Hughes in

his *Pharmacodynamics* is the best in our language. Ringer's article on aconite in his *Handbook of Therapeutics* contains much interesting information. Numerous essays and articles on its action and uses have appeared in the medical periodicals.

Monographs on Aconite and its alkaloid.

C. Gesner, *Libellus de Aconito primo Dioscoridis*, Zurich, 1857.
A. v. Stoerck, *Libellus de Stramonio, Hyoscyamo, Aconito*, Vindobonæ, 1762.
A. v. Stoerck, *Beobachtung über den sicheren Gebrauch und Nutzen des Eisenhuth, Schirling, Stechapfel, Bilsenkraut, und Zeitlose, mit Verwort von Rumpelt*, Dresden, 1765.
Manghin, *Epistola ad Stoerck de Aconito*, Vindobonæ, 1766.
J. F. Andreae, *De usu salutari Extracti Aconiti in Arthritide*, Halæ, 1768.
S. A. Reinhold, *De Aconito Napello*, Argentorati, 1769.
S. A. Spielmann, *De Aconito*, Argentorati, 1769.
J. T. N. Spalowsky, *De Aconito, Cicuta, &c.*, Vindobonæ, 1777.
J. Razoux, *De Cicuta, Stramonio, Hyoscyamo, et Aconito*, Nemansi, 1781.
J. L. C. Koelle, *Spicelegium observationum de Aconito*, Erlangæ, 1787.
E. Pallas, *Dissert. inaug. de Aconito*, Parisiis, 1822.
A. Turnbull, *On the Preparation and Medicinal Employment of Aconitine by the Endermic Method in the Treatment of Tic Douloureux and other painful affections*, London, 1835.
A. Magenta, *De Aconito*, Ticini, 1835.
Wenderoth, *Ueber wichtige einheimischen Arzneipflanzen-Aconitum*, Kassel, 1837.
J. C. de Man, *Specimen medicum inaugurale de Aconito*, Lugd. Batav., 1841.
J. F. Nelloli, *De Aconito*, Ticini, 1842.
C. Whitton, *On the History, &c., of Monkshood*, Edinb., 1842.
A. Fleming, *An Enquiry into the Physiological and Medicinal Properties of Aconitum Napellus*, London, 1845.
Schulz, *Dissert. de Aconitini effectu*, Marburg, 1846.
Massart, *Mém. sur les vertus thérap. d'Aconit, Jour de la Soc. Méd. de Gand*, xxiii, 1850.
H. H. De Soist, *Dissert. de Aconito*, Berolini, 1854.
Zobel, *De Herba Napelli seu Aconiti, Prag. Viertelj.* S., i, 1854.
C. Marcello, *Dell'uso dell'Aconito Napello nelle febbri continue ed intermittenti irritative come surrogato al Salasso ed al Sanguisugio*, Piacenza, 1856.
J. W. Headland, *On Poisoning by the Root of Aconitum Napellus*, London, 1856.
W. Reil, *Monographie des Aconit*, Leipzig, 1858.
G. Hahn, *Sur l'Aconit*, Strasbourg, 1863.
E. Hottot, *De l'Aconitine*, Paris, 1864.
F. Penny and J. Adams, *On the Detection of Aconite by its Physiological Action*, Glasgow, 1865.
H. Hoffmann, *Chemische-analytische Ermittelungen des Aconitingehaltes der offic. Aconitpflanzen*, Rostock, 1865.
L. Weyland, *Vergl. Untersuch ü. Veratrin, Aconitin, &c.*, Giessen, 1869.
E. Adelheim, *Forens. Chem. Unters. ü. die wicht. Acon. Arten*, Dorpat, 1869.
C. Schroff, *Beiträge zur Kenntniss des Aconit*, Wien, 1871.
C. Patrouillard, *Des Aconits et de l'Aconitine*, Paris, 1872.
H. Duquesnel, *De l'Aconitine et des prep. d'Aconit*, Paris, 1872.
L. C. Verriet, *Étude sur les Aconits*, Montpellier, 1873.
C. Ewers, *Ueber die phys. Wirk. des Aconitins*, Dorpat, 1873.
A. J. Guillaud, *De l'aconit et de l'aconitine*, Montpellier, 1874.
J. J. V. de Molènes, *De l'Aconitine*, 1874.
M. A. Franceschini, *Contrib. à l'étude de l'action de l'Aconitine*, 1875.
J. Harley, *On the Action and Use of Aconitia*, London, 1875 (reprint from *St. Thomas's Hospital Rep.*, v.).
P. Giulini, *Experimentelle Untersuchungen über die Wirkung des Aconitins*, Erlangen, 1876.
J. V. Laborde and H. Duquesnel, *Des Aconits et de l'Aconitine*, Paris, 1883.

Summary of its General and Special Actions.

Aconite has been more thoroughly investigated as to its physiological and pathogenetic effects than almost any other medicine. Not to speak of the many hundreds of experiments that have been made with it on mammals, birds, and reptiles, which have yielded confused and untrustworthy results, and led to many erroneous inferences as to its physiological action on the human organism, and which I have on that account omitted from this article, which is intended to show its positive effects on man apart from any physiological or pathological theories; there are, scattered throughout medical literature, many cases of poisoning by this drug and its alkaloid, a few very meagre trials of aconite before Hahnemann's time and a considerable number of carefully conducted provings of the plant and its alkaloid on healthy human beings since his time. These give us a clearer insight into the sphere of action of aconite than we possess of almost any other drug. The cases of poisoning, many of them fatal, do not give us an exhaustive picture of the powers of aconite. In such cases the onslaught of the poison is too violent to permit its more special effects to be observed. More useful insight into ito its action is obtained by the provings. The supplementary provings by the Austrian Society corroborate and complete Hahnemann's earlier investigations, and we cannot fail to remark that not only is the truth of Hahnemann's pathogenesis confirmed, but the therapeutic uses he inferred from his rather meagre provings are justified by the revelations of his Austrian disciples.

The effects of aconite and its alkaloid aconitine on the system generally are to cause all the phenomena of a very distinct fever of the acute inflammatory kind. No medicine produces in anything like the completeness of aconite every feature of this kind of fever, from the preliminary chilliness through intense rigor to heat and final perspiration. All these stages are gone through in a very short space of time. When the dose has been very large, as in many cases of fatal poisoning, there is no reaction from the chill and actual coldness, and collapse and death are its issue. The pulse keeps exact pace with the febrile phenomena, and we have the slow contracted pulse during the chill, the quick bounding pulse during the heat, and the soft, weak, and rapid pulse during the perspiration.

The action of aconite on the nervous system is not less marked. In the sensory sphere a tingling and numbness, spreading from one spot gradually yet rapidly all over the body, going on to anæsthesia. In the motor sphere slight twitchings, increasing to violent convulsions and tetanus. The anæsthesia may be attended by neuralgic pains of all sorts, and the convulsions may coexist with loss of power or paralysis.

The muscular system is within the sphere of aconite's action, and many of the symptoms of their disordered function it causes are not merely owing to its action on the motor nerves, but must be ascribed to a direct action on the muscular substance.

The joints, too, are largely affected by this drug.

Mucous membranes, especially those of the eye, buccal cavity, fauces, œsophagus and stomach are more or less violently irritated by it.

All the serous membranes, arachnoid, pleura, pericardium and peritoneum show signs of being acted on by aconite.

I shall now proceed to give a brief summary of its action on the various functions and organs of the body.

Disposition.—The most constant effects of aconite in this sphere are anxiety, fear, restlessness, and feeling as if death were impending.

Mind.—In most cases the intellect is not disturbed, but this is by no means always the case. In some instances there is great dulness of intellect, loss of memory, delirium, loss of consciousness, stupor, and coma.

Sensorium.—Here we meet with many varieties of vertigo, even to the extent of staggering and falling, confusion of head, intoxication.

Head.—We find symptoms of congestion, heat and heaviness, fulness, especially in frontal region, and pains of many kinds, sometimes extremely severe. Post-mortem examination shows a congested state of the blood-vessels of the brain and its membranes, and sometimes serous effusion under the arachnoid and in the ventricles.

Sleep.—Sleeplessness, or great drowsiness and dreams of a more or less disagreeable character, are almost constant effects.

Eyes.—In most cases the pupils are more or less dilated, sometimes insensible and sometimes contracted. There are well marked symptoms of conjunctivitis, even to the extent of chemosis, with excessive pain. A peculiar brightness or sparkling appearance of the eyes is sometimes observed. The deeper tissues of the eye are sometimes affected, and signs of congestion of the choroid are noticed.

Vision.—Dazzling of the eyes and photophobia, and sometimes an opposite state, when there is a desire for light. There are many disturbances of vision from dimness and mistiness to complete though transient blindness.

Ears.—Otalgia of various kinds and slight hints of otitis have been observed.

Hearing.—Increased sensitiveness to noise, but more commonly dulness of hearing. Tinnitus aurium of various degrees and characters.

Nose.—Congestion of nasal mucous membrane, and epistaxis.

Face.—Tingling formication and numbness are frequent. Prosopalgia is very well marked. Twitchings, convulsions of the muscles, and distortion of features are not uncommon. Pallor of face is frequent, but there is sometimes the opposite, namely red flushed face and glowing cheeks, amounting even to erysipelas, and frequently swelling or sensation of swelling of face.

Lips.—Burning and tingling are common, and paleness or blueness have occasionally been seen.

Mouth.—Convulsive movements of the muscles about the mouth and jaws, with spasmodic closure of the latter, amounting even to trismus, are observed. The buccal mucous membrane shows signs of irritation, more or less intense, from tingling and burning, with or

without dryness, to objective symptoms of inflammation. Increased flow of saliva is a very constant symptom.

Teeth.—Several varieties of toothache are produced, but nothing very characteristic.

Tongue.—Various symptoms of spasm of the lingual muscles, and of transient paresis are seen. Irritation, as tingling and burning, and even shooting pains, indicate a specific action on the larynx.

Throat.—Spasmodic and paretic affections cause difficult deglutition and choking. Irritation of the mucous membrane, fauces, pharynx and œsophagus are felt in dryness, tingling, burning, scraping and other pains, and seen in inflammatory redness and swelling. Post-mortem examination shows commencing inflammation of fauces and œsophagus.

Taste.—Perverted and extinct taste are noticeable.

Appetite.—Though loss of appetite is the commoner symptom, increased hunger has also been noticed. Thirst, of course, considering the frequency of febrile symptoms, is not rare.

Stomach.—Many varieties of gastric pain are observed. Nausea and vomiting are among the common symptoms. The symptoms of irritation and even inflammation of the gastric mucous membrane indicated by the sensations are fully confirmed by the post-mortem examinations, which show irritation, going on to inflammation, sanguineous effusion beneath mucous membrane, and even gangrenous spots.

Abdomen.—Irritation of all the intestinal track, interference with digestion, great development of flatulence, congestion of liver and spleen are the states indicated by the symptoms and confirmed by the autopsy. It will be observed that the inflammatory condition of the stomach sometimes passes into the duodenum, and even to the small intestines. That the peritoneum is affected is probable from the character of some of the pains, and one autopsy certainly showed serous effusion in the abdominal cavity. But the frequent occurrence of diarrhœa shows how severely aconite acts on the intestinal mucous membrane, and the character of the stools shows sometimes great implication of the liver, which may amount even to jaundice. The rectum and anus seem to be specially acted on, sometimes showing tenesmus and sometimes paralysis of the sphincter.

Urinary organs.—Though the urinary secretion is sometimes suppressed for a time it is more frequently increased. In its character the urine is often high coloured as in fever, and sometimes copious, clear, and limpid, as in nervous conditions. There is sometimes tenesmus, sometimes paralysis, of the neck of the bladder. The symptoms of irritation of the urethral mucous membrane are marked. Congestion of the kidneys has almost always been found after death.

Male genitals.—Pains in testicles and increased sexual desire are the most noticeable effects. In one case the penis was found after death in a state of erection and with a seminal emission.

Female genitals.—It seems to promote the menstrual flux and the lacteal secretion.

Respiratory organs.—We find many varieties of acute affections of these organs. Coryza, catarrh, laryngitis, tracheitis, bronchitis with

sneezing, coughs of various kinds, sometimes dry and tickling, sometimes with mucous expectoration occasionally streaked with blood, sometimes with expectoration of pure blood. Hints of pleurisy and pneumonia are very decided. The post-mortem appearances show very considerable congestion of the pulmonary parenchyma.

Heart and circulation.—Nowhere is the action of aconite more decidedly displayed than in this sphere. It exercises a marked influence on the motions of the heart, at one time lowering its beats to an extreme degree, at another causing great acceleration and violent palpitation. It deranges the rhythm of the heart's action, causing irregularity, intermission, feebleness, and even complete cessation. It causes many pains in the cardiac region. Blood drawn from the arm showed the buffy coat of inflammation. Post-mortem examination showed a fluid condition of the blood in the heart and large vessels. The left ventricle was generally contracted, while the right contained fluid or slightly coagulated blood. Serum was sometimes found in the pericardium. The febrile symptoms, which are to a great extent dependent on the action of the drug on the circulation, are particularly rich. We find chilliness amounting to rigor succeeded by heat and perspiration often to a profuse degree. The fever of aconite resembles acute inflammatory fever, and in some cases seems almost to produce a picture of rheumatic fever with heart complication.

Neck and Back.—Here we find stiffness of both the spasmodic and rheumatic kind. The muscular pains resemble those of acute rheumatism.

Limbs.—Tremblings and twitchings of the muscles, stiffness, convulsions and subsultus tendinum, weakness, and even paralysis of the muscles. Tingling and numbness of the extremities. Muscular and arthritic pains of various kinds.

Skin.—Paleness, dusky hue, and yellowness of the skin are conspicuous. There are eruptions of various kinds, chiefly small red spots, papules and vesicles on various parts. Tingling, formication, and numbness and other subjective symptoms are common occurrences.

Generalities.—Great languor, lassitude, exhaustion, and prostration are very constant. Syncope is not uncommon. General convulsions of tonic or clonic character, sometimes even tetanus and opisthotonos. General tingling, formication, numbness, and sometimes insensibility of the surface. Pains of various sorts, muscular, arthritic, and neuralgic.

Aconite and Aconitine Poisonings and Provings.

List of authors cited, with the figures referring to them.

Aconite Poisonings.

1. Richard.
2. Matthiolus.
3. Do.
4. Van Helmont.
5. Willis.
6. Roedder.
7. V. Bacon.
8. Pallas.
9. Otto.
10. Sherwin.
11. Dix.
12. Pereyra.

13. Perrin.
14. Jour. de Chimie med.
15. Baldriani.
16. Do.
17. Pereira.
18. Do.
19. Devay.
20. Male.
21. Fleming.
22. Geoghegan.
22½. Do.
23. Gray.
24. Topham.
25. Lanzer.
26. Simpson.
27. Trans. Med. Soc. Bombay.
28. Canton.
29. Headland.
30. Bone.
31. Mackinlay.
32. Massey.
33. Koch.
34. Hatfield.
35. Alderson.
36. Jeanes.
37. Ward.
38. Do.
39. Do.
40. Do.
41. J. B. Brown.
42. Kay.
43. Atthill.
44. Skinner.
45. Henson.
46. Strachan.
47. O'Connor.
48. Do.
49. Belcher.
50. Taylor.
51. Easton.
52. Johnson.
53. Roy.
54. Sanderson.
55. Richardson.
56. H. W. Brown.
57. Dobie.
58. Middlesex Hospital.
59. Bagshawe.
60. Phil. Med. Times.
61. Bagshawe.
62. Anstie.
63. Read.
64. Neild.
65. Blake.
66. Weddel.
67. Lowne.
68. Jones.
69. De Mussy.
70. Elliott.
71. O'Brien.
72. Hill.
73. Wood.
74. Pike.
75. Netherclift.

Aconitine Poisonings.

1ª. Bird.
2ª. Buscher.
3ª. Buscher.
4ª. Meyer.

Aconite Provings.

I. Arneth.
II. Böhm.
III. A. Br. (Hencke).
IV. Dworzak.
V. Gerstel.
VI. Mrs. Gerstel.
VII. Heinrich.
VIII. Hencke.
IX. Maschauer.
X. N. (Hencke).
XI. N. N.
XII. Reisinger.
XIII. Rothansl.
XIV. Schneller.
XV. Schneller and Flechner.
XVI. Schwarz.
XVII. Siegel.
XVIII. De Soist.
XIX. Sterz.
XX. Stoerck.
XXI. W. (Hencke).
XXII. Wachtl.
XXIII. Watzke.
XXIV. Weinke.
XXV. Würstl.
XXVI. Wurmb.
XXVII. Von Zlatarovich.
XXVIII. Potter.
XXIX. Robinson.
XXX. Woodward.

Aconitine Provings.

Iª. Dworzak.
IIª. Heinrich.
IIIª. Harley.
IVª. Harley.
Vª. Hottot.
VIª. Reil.

Aconite Poisonings.

1.—A man got a drachm of acon. Immediately tightness of chest, pain in stomach, vertiginous obscuration of sight, unaltered pulse. He grew very weak, and thought he must die. On an antidote (bezoar caprarum indicarum) being given he felt better; there was vomiting with anxiety, which gave him hope, but he felt as if something collected in his stomach. Pain in occiput and throat, delirium, he whistled on a leaf. The delirium soon passed away. Complained of pains in stomach, head, jaws, chest, and here and there in joints. After seven hours pains in all the joints; abdomen distended as if he were dropsical; under the ribs tense, painful and hard; stitches in kidneys; retention of urine; one arm and one leg paralysed. Pulse intermittent and febrile. Some vomiting; several stools during the day; complained of pressure and coldness in stomach, as if a stone lay there. Then came on a severe ophthalmia with discharge, the pain of which was so great he wished to die. In eight hours all the symptoms were gone, and in the morning he was quite well.—Claudius Richard, in *Schenk's Observationes*, p. 876, 1524.

2.—A man got a drachm of acon. In three hours complained of great prostration as if the body were ulcerated (de universi corporis lassitudine ulcerosa); heaviness at præcordia, though his look was lively and he spoke confidently; there was cold sweat on forehead, and pulse scarcely to be felt. An antidote was now given, when his eyes were distorted, the mouth drawn to one side, nape stiff, syncope, and he would have fallen if not supported. He had some stools. When he came to himself he complained of chilliness, vomited fetid black bilious matter, turned on his left side as though to sleep. At last he ceased to speak, and died, his face turning blue.—Matthiolus, *Comment. in lib. IV, Dioscorid.*, ed. Bauhin, cap. 73, p. 761, 1561.

3.—A man, aged 27, got one drachm acon. It tasted like pepper. In an hour began to vomit. He got seven gr. bezoar. Immediately vomiting of green bile, sensation as if a ball lay on the scrobiculus cordis, that rose upwards and spread a cool air over crown and occiput, then paralytic feeling in left arm and leg, impossibility of moving them, could still move hand. When the left side was relieved the same occurred on right side. Complained that all the vessels in his body grew stiff; vertigo, burning in head as though the skull were filled with boiling water, convulsions of eyes and mouth, a very severe pain in jaw as if it would fall off, congested eyes, blue face, black lips. Abdomen as if distended with water. Pulse and disposition altered with the severity of the symptoms; sometimes he despaired of his life, sometimes thought he would recover; sometimes he was quite rational, sometimes talked nonsense, sometimes wept, sometimes sang. Thirst for cold water. He three times lost his sight, and three times said death was nigh. Speech unaffected. In seven hours was all right.—Matthiolus, loc. cit.

4.—Applied a piece of the root to the tip of the tongue. Though I did not swallow it, I had a great flow of saliva, soon felt as if the

skull were tightly constricted externally with a band. Some domestic affairs occurred, I did some calculations, wandered about the house, and did everything hurriedly. Then there occurred (what had never before taken place) that I felt as though I did not understand, know, or imagine anything in my head, as usual, but to my astonishment I felt plainly, clearly, and constantly as if all these operations took place in the præcordia and round about the mouth of the stomach, and I noticed quite distinctly that, whatever I thought, the head had nothing to do with it, that all the functions of the mind were in the præcordia, and not in the head. This lasted a considerable time, and though I had been accustomed to have ecstacies, this was not like them. After about two hours had two slight attacks of vertigo, and then the thinking faculty occurred in the usual way. I tried to bring on the same state by taking acon. again, but it did not recur.—VAN HELMONT, *Demens Idea*, 1652.

5.—WILLIS said that a woman having partaken of the tender leaves of acon. became restless, anxious, then furious, and died in twenty-four hours.—*De anima brutorum*, Amst., 1674, p. 287, quoted by WIBMER, I, p. 29.

6.—A man who had a very small wound the size of a pin's head on his thumb cut some acon., the juice of which came in contact with the wound. He immediately felt horrible pain in the whole arm, especially in the thumb, had cardialgia and præcordial anxiety, with fear of suffocation, syncope, inward heat and thirst and other dangerous symptoms, so that he thought he must die. The arm became bright red, swollen; the pain was so intolerable that he nearly fainted. The arm went on to suppurate, a quantity of pus was discharged. He recovered in fourteen days.—ROEDDER, in *Alberti, Jurispr. med.*, v. 6, obs. 24, p. 727, 1736.

7.—A man ate in a salad an unknown quantity of acon. root. He soon felt unwell. Thinking he was poisoned he drank a quantity of oil and carduus tea, which caused him to vomit the greater part of his supper. But the symptoms increased. When seen at night, he lay with his head propped up, eyes staring, teeth spasmodically closed, hands, feet and forehead covered with cold sweat, pulse could not be felt, breathing short and scarcely perceptible. Head drawn backwards. The mouth had to be forcibly opened to introduce ammonia and more carduus tea, which caused him to cough and then vomit, after which he swooned. He then got sal volatile and tinct. croci in wine. He then had urging to stool and fæcal evacuation. Complained of heaviness of head, his strength and spirits were so exhausted, that though his stomach was relieved he thought he must die. Pulse became more perceptible though intermittent and irregular; there occurred two or three beats in rapid succession, then it made a stop of as long or a longer duration. He then got a potion of Aq. epidem. theriac. Androm., confect. Alkermes, and occasionally lemonade. He remained awake for an hour or two, felt very chilly, causing him to heap on more bedclothes; this caused an agreeable warmth to spread over his limbs, and slight perspiration. Slept quietly for four or five hours, and woke refreshed. He said he first felt tingling heat not only in the

tongue but also in the jaws, so that the teeth seemed to have fallen out. He imagined his face was swollen to double its size. The tingling heat gradually increased until it involved the whole body, especially the extremities. He felt unsteadiness in the joints, especially the knees and feet, and a twitching in the tendons so that he could scarcely walk across the room. He thought he felt a stoppage and interruption of the circulation of the blood in all his limbs; from the wrists to the finger-tips and from the ankles to the toes he felt no circulation at all. Later the head was giddy, mist before the eyes, look wandering; he had a constant humming hissing noise in the ears till the evening came on.—(VINCENT BACON, *Phil. Trans.*, vol. 38, p. 287.)

8.—Five persons drank each a glass of brandy in which acon. root had been macerated. Three died in three hours with following symptoms: burning feeling in throat and belly, inclination to vomit, then vomiting and stools, with pain in stomach and belly; face puffed, belly distended. *Post-mortem.*—Gullet, stomach, and bowels very red and inflamed. The veins of the bowels very perceptible, inflammation stopped at cæcum; mesentery much inflamed, much serum in abdominal cavity; lungs heavy, bluish, posteriorly violet, hardly crepitating, filled with blood; heart and lung-vessels unaltered; brain healthy, but its vessels highly injected; blood partly coagulated, partly fluid.—PALLAS, *Diss. inaug. de Acon.*, Paris, 1822.

9.—A woman, aged 27, of bilious temperament and robust constitution, hitherto in enjoyment of perfect health, admitted in consequence of suspected syphilis from nursing a child. Appearance good, appetite, all functions and pulse normal, nipples slightly excoriated. On 4th day got 2 drachms of acon. extract. 5th. The same. 6th. 3 drachms of acon. ext. 7th. ½ oz. ext. acon. 8th. Little appetite, skin and eyes slightly yellow. 9th. Jaundice more marked, 1 oz. ext. acon. 10th. The yellow colour darker, complains of nausea, cardialgia, anorexia; must keep her bed, 1 oz. ext. acon. 11th. At night nausea, vomiting, and delirium, expression much changed, look extinguished, can scarcely speak audibly, ½ oz. ext. acon. 12th. Night very restless, got out of bed several times, could not get in again without help; is tied down, great anxiety, no medicine. Evening: is unable to speak, lies in a stupified state, eyes closed, facial muscles twitch; trismus, slow, laboured breathing, pulse quick, irregular; skin burning hot. A pound of blood abstracted. 13th. Jaundice slightly improved, other symptoms increased, abdomen swollen; the blood drawn has a yellow surface with soft crust. Another venesection; barley broth with 6 grs. tartar emetic, and 2 clysters with 20 grs. of tartar emetic in each. In the evening much worse. Venesection to 1 pound. 14th. Soporous state, laboured breathing, with rattling. Barley broth with tartar emetic again prescribed, but she died at night. *Post-mortem.*—Cerebral vessels full of blood, no extravasation in ventricles, stomach covered with black gangrenous spots.—OTTO, *Reisen*, Hambg., 1825, pt. i, p. 377.

10.—A maid-servant took a mouthful of tincture of the root. When seen she lay in bed on back, eyes staring, pupils contracted, livid complexion, stiff jaws, coldness and pulselessness of extremities, short, incomplete, laboured breathing, weak heart's beats, sighing, tossing

about arms, rattling and vibration in trachea. A zinc emetic was followed by convulsions, eyes turned up under lids, fists pressed against chest, teeth fast closed, thick frothy saliva between lips; urine and fæces passed involuntarily. Vomiting excited by tickling fauces, after which pulse returned in wrist. Continued vomiting, after which the sight improved. Bilious vomiting, pulse again imperceptible, complained of oppression of head and præcordia. Jugular vein opened; when ten ounces of blood had flowed said she was better, breathing easier. Said she felt as though she came out of a narrow, dark, hot room into a well-lighted one. Vomiting again; pulse became fuller, intermitted every fourth beat; præcordial oppression less. Pulse rose to 70, and later to 100; skin hot and dry. Next day pulse small, had little sleep, tongue furred, headache, dying away of hands. Next day well. Said, "At first I felt shooting and prickling in arms and fingers, numbness in shoulders, tongue, and mouth, then in legs and feet. Later feeling of swelling of face and constriction of throat. Face blue and distorted; wished to go to bed; legs refused their office; fell down on stair." In this state she was found.—SHERWIN, *Lancet*, vol. ii, 13, 1837.

11.—A boy, aged 1 year, swallowed a bit of acon. root. There ensued vomiting, great tendency to stupor, seemed to be in pain. Pulse slow and intermitting, pupils dilated. Recovered after various external and internal remedies.—R. DIX, *Lancet*, vol. i, 1839, No. 26.

12.—A man, aged 45, had been treated in hospital for seven months for rheumatism of the knee without benefit. He then got extract. acon. alcohol., in doses of 2 to 5 grs., with good effect on the rheumatism. The supply of extract being exhausted, a new extract was procured, and of this he took 5 grs. In quarter hour he had trembling and creeping in limbs attended by shooting pain. The shooting pains increased, the trembling changed to convulsions. A taste like pepper in throat and mouth. Soon afterwards vomiting of contents of stomach. During the convulsions he lost consciousness. When his consciousness returned the eyes were dazzled. At same time a fixed headache as if a hot iron were bound round head. After the convulsions profuse sweat. Pulse unequal and slow. Five hours after the poison had been taken, pale face, with expression of anxiety and restlessness, very mobile eyes, impatience, tosses about restlessly, and constantly changes position; speaks much and rapidly; cold tongue, feeling of burning in fauces, vomiting of slimy stuff; orthopnœa, twenty-five respirations per minute, pulse 54 unequal, soft and full, as though the blood did not fill the arteries. Mucous râles in lungs posteriorly. The heart beat only once against thoracic wall while the pulse beat thrice, but the beats of the left ventricle were synchronous with the pulse. The right auricle of heart seemed to be in a constant convulsed state, its movements were quick, irregular, and in no relation to the motions of the ventricles. The limbs began to get cold. No stool. After guaco, ammonia and rubbing in of tinct. canthar. on precordial and dorsal region, reaction set in in the evening, and the next day he was well.—PEREYRA, *Gaz. des Hôpitaux*, 26th March, 1839.

13.—A rheumatic patient took a dose of extract. acon., probably

5 grs. Death took place after four hours of pain, by gradual stoppage of respiration and circulation. Chief symptoms; extreme burning pain in throat, vomiting, cold sweat, anxiety, tossing about, syncope, small pulse. *Post-mortem.*—Expression shows fright; cerebral arteries much injected; brain studded with blackish points; parenchyma of lungs full of blood, scarcely crepitating; left ventricle of heart empty, right filled with clotted blood. Stomach congested.—PERRIN, *Gaz. des Hôpitaux*, 26th March, 1839.

14.—A child, 21 months old, ate some leaves and flowers of acon. In half hour staggered on legs; face puffy; soon could not stand; complained of pains in belly. In two hours got tartar emetic and vomited, then the eyes were convulsively disturbed, then came on trismus and opisthotonos and general convulsions, and in five minutes the child was dead.—*Journ. de Chimie Med.*, February, 1840, p. 94.

15.—A scorbutic man, aged 60, took for several days 3 oz. of expressed juice of acon. instead of *cochlear. off.* An hour afterwards general ill-feeling; then anxiety; oppression of breathing; inclination to vomit. The doctor thinking it was an attack of asthma gave castor oil and a blister on chest. The anxiety increased, strength declined, and he died soon afterwards.

Two women, aged 55, affected with anæmia and pellegra got acon. juice. They soon felt unwell, had dyspnœa, convulsions, then almost paralytic weakness and died 2½ hours after taking the poison.

Post-mortem of all three.—Abdomen distended; blueness of nails of fingers and toes, which are contracted. Vessels of brain and arachnoid injected, serous effusion under meninges at base of brain; no fluid in ventricles. Lungs crepitant, lower lobes filled with black blood; heart lax, with little black blood, large vessels almost empty. Liver normal. Gall-bladder contained little watery yellowish bile. Spleen soft and brittle. Distended stomach contained a moderate quantity of a viscid blackish-green matter; its mucous membrane on several spots, especially in the fundus and large curvature, irregularly reddened. The mucous membrane of duodenum and rest of small intestines contained a considerable quantity of the same viscid green stuff, and showed the same red spots in some parts. Kidneys filled with blood; bladder nearly empty.—BALDRIANI, *Memoriale della med. contemp.*, 4th September, 1840, p. 296. In *Oest. Zeit.*, i, 2, 115, wrongly given in Fleming as Ballerdini.

16.—In several cases (11 ?) that had taken acon. in place of coch. Symptoms: rapid sinking of strength with corresponding mental depression, striking pale face and alteration of features; blue ring round the dull eyes, dilated pupils; vertigo with a stretching and dull headache up in occiput. Vomiting of green stuff, in one case diarrhœa of this same appearance. Feeling of oppression or anxiety in chest; general coldness of extremities rapidly increasing, with circumscribed blueness of finger- and toe-nails; some cramp of calves; pulse small, weak, in some not perceptible. After administration of wine and spirits these symptoms gradually disappeared.—BALDRIANI, *ibid.*

17.—A man took one root and a half. In forty-five minutes burning and numbness of lips, mouth, and throat, soon extending to stomach.

Then violent and constant vomiting until half an hour before death. Also warmth of chest, coldness of extremities, pain in head and excessive trembling. Frequently raised hand to throat. Quite conscious till within two minutes of death, which occurred in four hours. Expired in a fainting state.—PEREIRA, *Elem. Mat. Med.*, ii, p. 1339, 1842.

18.—A woman ate half a root. Nearly the same symptoms as preceding. The paralysis and disorder of the external senses were greater, the sensibility of the body much impaired, lost power of articulation. Felt very giddy, but not delirious or sleepy. Put her hand frequently to throat. In five or six hours began to recover.—PEREIRA, *ibid.*, p. 1339, 1842.

19.—A man, aged 35, drank forty grammes tinct. acon. Immediately heat and constriction in throat; extreme restlessness and could not remain in one place, complained of his throat, and of a burning down the œsophagus. Extreme anxiety, tongue whitish, nausea; trembling when walking, staggering gait. Pain in fauces, extreme restlessness, fear of death. In eight minutes copious vomiting. In two and a half hours cannot stand upright, attacked by a kind of convulsions; upper and lower extremities drawn inwards, fingers dead, thumb drawn inwards, fist cannot be opened. Legs adducted. Face covered with cold clammy sweat. Eyes turned upwards showing only the whites. Radial and temporal arteries pulseless. This lasts three minutes, then faintness. Thinks and says his last hour has come. Consciousness intact, but is quite blind. He then vomited small quantities, constant nausea. After four and a half hours extreme anxiety, intermission of attacks and nausea. An emetic caused vomiting without relief. After five hours sight returned, but fits as frequent and more violent than ever, temperature of skin sinks every moment; some shivering followed by icy-coldness; countenance Hippocratic; head drawn strongly backwards; cracking of joints during fits; breathing stertorous, mucous râles heard at a distance. Mind quite free, not the slightest pain. Palms insensible, he does not feel deep pin-pricks. Counter-irritants were freely employed and iodine internally. After seven hours reaction commenced, heart's beats again perceptible, pulse stronger, some vomiting, return of warmth and general comfort. After eight hours appears better, profuse warm sweat, pulse 125, sensibility of palms returned, respiration free. He recovered, but for days retained in his features the expression of fright.—DEVAY, *Gaz. méd. de Paris*, 5th Jan., 1844, p. 12.

20.—Dr. Male, aged 65, had been complaining of pains in back and loins for two months. Took tinct. acon. for four days; beginning with five drops two or three times a day, and increasing to six, eight, and ten drops. On evening of fourth day took ten drops. On fifth day, in the morning, extremities cold, surface cold and clammy, pulse 130, feeble; cramp and pains in legs; spasmodic pain in stomach; some diarrhœa; felt sure he should die, but very anxious to recover. Gradually sank and died on seventh day.—*Brit. and For. Med. Rev.*, vol. xx, p. 469, 1845.

21.—A boy, aged 13 months, ate a piece of root. In a few minutes sickness and vomiting; in two hours coldness of surface, pale

and bloodless features, slow and intermittent pulse, dilated pupils, general prostration.—FLEMING, *Inquiry*, p. 157, 1845.

22.—A man took uncertain quantity of powdered root in a salad prepared by his wife. Said it had a sharp disagreeable taste. Burning at heart, tenderness at pit of stomach, vomiting, coldness, biting in tongue, and tingling through whole flesh, excessive restlessness, occasional incoherence, locked jaw, clenching of hands, frothing at mouth. Died in three hours. *Post-mortem.*—Brownish black patches on inside of stomach.—GEOGHEGAN, quoted by *Christison on Poisons*, 1845, p. 70.

22½.—A neighbour also partook of the salad. In two minutes pricking in mouth, burning in throat, gullet, and stomach; then salivation, feeling of swelling in face, general numbness and creeping in skin; then excessive restlessness, coldness of integuments, dimness of sight, stupor. In an hour became speechless, fainted repeatedly, frothed at mouth, clenched hands; vomiting ensued, with relief, afterwards frequent attacks of vomiting, purging, tenderness of epigastrium, cramps, tingling in flesh. Recovered slowly; could not work for five weeks.—*Ibid.*

23.—A healthy boy of 14 complained of pain in stomach after supper. Tinct. acon. given by mistake. After fifteen minutes complained of anxiety, pupils dilated and but slightly mobile, muscular movements difficult, head confused, nausea and vomiting of mucus. An emetic caused vomiting, but now complained of pain in œsophagus and stomach, great prostration and exhaustion, pulse fell to 45, extremities cold, pupils highly dilated, nearly immovable, sight almost gone, very restless, tossing about. After a clyster, stimulating frictions, and brandy internally, slight improvement, soon collapsed, respiration slow and difficult, muscles of nape and back rigid, swallowing impossible. In two hours died perfectly conscious.—H. M. GRAY, *New York Jour. of Med.*, Nov., 1848.

24.—A woman, 27, anæmic, took, at 11 a.m., a tablespoonful of a mixture containing ℥ss of tinct. acon., to ℥viij of mixture. Immediately felt numbness of tongue, with difficulty of swallowing, then began to cry violently, with twitchings of facial muscles. Then lost power of walking, and vomited mucus. Seen at 2.30 p.m.; lying on back, eyelids closed, pupils slightly contracted, quite unconscious, in one hour only said twice "what is it?" Occasionally uttered a plaintive cry. Constantly moving tongue round inside mouth, thrusting it out and moving it from side to side. Pulse weak, regular (it had been intermittent), hands and feet cold, constant lacrymation, paroxysms of sighing. Said when rallied, that face felt very large and all the teeth coming out. Little sleep, disturbing dreams. Next day pain in lower part of back and numbness in both arms. On recovering had no recollection of what occurred from 12.30 to 2.30 p.m.—TOPHAM, *Lancet*, 1851, ii, 56.

25.—A patient took a teaspoonful of acon. tinct. After fifteen minutes complained of nausea and gnawing pains in stomach. Skin cold, pulse 100, weak, irregular; fingers spasmodically extended, transient convulsions shook the whole body, intelligence unimpaired. After three hours complained of burning pain in œsophagus, stomach,

bowels, chest, and sacrum, pulse weak, 120, intermitting; he got a convulsion lasting five minutes, and several spasmodic twitchings in different parts, especially the fingers; pupils dilated, but sensitive to light. Recovered.—M. LAUZER, *Rev. de Thérap.*, ii, p. 68, 1853.

26.—A young man swallowed about ʒij of tinct. acon. between 6 and 7 p.m. At 11.30 p.m. in a state of great prostration; pulse imperceptible at wrist, heart's action scarcely audible, skin cold and clammy, eyes staring. Looked distressed, and did not wish to be interfered with; jaws firmly clenched (apparently voluntarily); pupils dilated, right nearly oval, left irregularly polygonal. Quite unconscious till death at 11.30, five ½hours after taking poison. No drowsiness. *Post-mortem.*—Both pupils slightly dilated. Dura mater and brain not congested, a little serum in ventricles. Dark fluid blood in both ventricles of heart. Lungs not unusually congested. Mucous membrane of pharynx redder than normal. Œsophagus pale. Some patches of congestion along large curvature of stomach.—H. SIMPSON, *Lancet*, 1855, p. 467.

27.—A Hindoo priest, aged 50, had been taking daily for twenty-four days, for leprosy, 15 gr. of "bishnak," root of a. ferox. On recommendation of a friend took the white variety (he had been using the black) at 10 a.m. 15 gr. Soon felt uneasy, burning in mouth and fauces, formication and confusion of mind. Drank much milk. Soon vomited freely. Four hours after taking drug came to hospital. Was sensible, stupid expression, unsteady gait like a drunken person, complained of heat and burning in throat, confusion of mind and formication all over surface. Constant vomiting. Pulse feeble and rapid, skin coldish, covered with moisture, pupils normal. Got well after stimulants.—*Trans. of Med. and Phys. Soc. of Bombay*, 1855, quoted in *B. and F. M. C. Rev.*, Oct., 1855, p. 506.

28.—A man took an overdose of tinct. acon. Seen shortly afterwards, was unable to give an account of himself. Head thrown back, and was rubbing his throat; symptoms of general palsy, restlessness, cold sweat; pulse scarcely perceptible, pupils dilated; vomited. Recovered.—CANTON, *Lancet*, 1856, i, p. 315.

29.—A gentleman drank some coffee. The coffee strainer had been used for preparing aconite tinct. He went out for a walk; had tingling sensation in mouth. Tongue felt too large, lips and face tingled, creeping sensation down both arms and thighs, giddiness, swimming before eyes, great weakness, inability to stand, stiffness in neck and back, head felt as if in a vice and was very heavy; felt that he wanted to draw a long breath continually, when he did so the giddiness was relieved. Symptoms gradually abated.—HEADLAND, *Lancet*, 1856, i, p. 342.

30.—A paymaster got by mistake tinct. of acon. root. Seen soon after, at 8.45 a.m., said he felt unwell. Soon complained of giddiness, and that his legs were going away from him; got a cup of coffee, but died in spite of active treatment one and a half hour after taking poison. Chief symptoms: giddiness, intense burning along tongue extending to fauces, coldness of hands and feet and along spine, twitches of facial muscles and of fingers and toes, dimness of vision,

dilated pupils, inability to swallow, weak pulse, involuntary escape of fæces; one general convulsion before death. Previously skin cold, lips blue, pulse almost imperceptible, respiration oppressed and laboured. *Post-mortem* twenty-four hours after death. Stomach contained dark brown fluid, mucous membrane congested in patches of various sizes of dark red colour, right side of heart filled with liquid venous blood, liver congested; kidneys, spleen, and intestines congested.—W. H. Bone, *Lancet*, 1856, i, p. 369.

31.—A child, 2½, ate some leaves of acon. before 1 p.m. Became fretful about 3 p.m. At 5 p.m. in great agony, very sick, vomiting phlegm. At 5.30 retching violently, complaining of pain in stomach; pupils contracted. Mustard emetic caused vomiting. Child rolled about in bed screaming with pain, vomiting persisted till 11 p.m., then collapse came on, limbs became flaccid, with patchy spots and discoloration on them. Coma came on, and the child died at 9 a.m. The child had eaten the leaves before 1 p.m. previous day.—Mackinlay, *Lancet*, 1856, i, p. 715.

32.—A man, 48, went to bed with some acon. root, and ate a small portion with bread and milk at 11 p.m. After quarter hour began to vomit, was tremulous and giddy; continued to vomit violently, soon became insensible, and died at 1.15 a.m. *Post-mortem* two days afterwards. Stomach contained little red viscid fluid, its mucous membrane of deep chocolate colour throughout, most about cardiac orifice and greater curvature, many bloody points in patches here and there, and small bits of acon. root. Brain and other organs healthy.—J. Massey, *Lancet*, 1856, ii, p. 100.

33.—A man, aged 30, took acon. root, could not move tongue, and had all sorts of hallucinations of vision; after a short time vomiting, involuntary stool and urine, peculiar sensation in extremities, feeling of prickling and electric shock throughout the body, syncope and death.—Koch, *Würtemb. Correspondenzbl.*, 1856, p. 35.

34.—A man, 64, seen at 11 a.m. Found stretched in bed, face downwards, groaning, complaining of agonizing, burning pain at epigastrium, parched mouth, intense thirst, constant retching, pulse imperceptible, skin cold though perspiring; countenance expressive of extreme agony, jactitation incessant, scarcely half minute in same posture. At 8.30 a.m. that morning was seized with deadly sickness, faintness and pain in stomach, got an emetic of ipec. at 9.30 a.m., which caused vomiting without relief. Had taken acon. root at 8 a.m. Sulphate of zinc caused vomiting of a fluid like gravy soup with a large quantity of tenacious mucus. Died at 11.30 without convulsions, and retaining consciousness to the last. *Post-mortem* thirty-two hours after death. Rigor mortis strong, gastrocnemii muscles contracted into a ball as in cramp, no clenching of hands or distortion of features. Pupils normal. On incising scalp much fluid blood flowed from occipital region. A considerable quantity of fluid blood and serum escaped from cranial cavity. Arachnoid dense and opaque enclosed a large quantity of serum, pia mater gorged with fluid blood. Bloody serum oozed out of sulci between convolutions in large quantities, numerous bloody points on cut surface of brain. Little fluid

in ventricles. Heart flaccid, right side contained slightly coagulated blood, left side empty. Stomach contained much food and four slices of acon. root. Mucous membrane showed a reddish-brown patch, size of half-a-crown at cardiac extremity, elsewhere normal.—HATFIELD, *Lancet*, April, 1857, p 349.

35.—James D—, 58, admitted to St. Mary's Hospital five minutes before 1 p.m. Had eaten dried acon. root at 8 a.m. At eleven in great pain, vomiting and purging, seemed very dizzy. Often lost consciousness for a few seconds, and then became sensible. When admitted five hours after the poison, was very pale, collapsed, skin cold and perspiring, pulse slow, intermittent, scarcely perceptible, bowels relaxed, quite conscious. Died in twenty minutes. *Post-mortem* thirty-seven hours after death. Head much thrown back, muscles of neck prominent and rigid. No rigor mortis in upper, slight in lower extremities. Face and skin of body pallid. Vessels of brain did not contain much blood, substance pale. On removing sternum dark blood flowed from divided vessels. Pericardium contained ʒss of serum. Cavities of right side of heart flaccid, and contained about ʒj of fluid blood, small black coagulum in auricle. This was the only clot found, all the rest of blood in body was fluid. Left ventricle firmly contracted, with auricle containing ʒiij blood. Lungs emphysematous and inflated, both lower lobes slightly congested. Spleen dark and congested. Kidneys congested, soft. Bladder contracted, contained ʒss urine milky from lithates. Stomach contained ʒiij thick grumous fluid with reddish tinge, congested bright scarlet. Rugæ less distinct. The bright colour extended from the pylorus into duodenum, gradually becoming darker, and ceasing in jejunum. Duodenum like stomach contained reddish fluid. Œsophagus congested and tinged violet; this colour extended to pharynx and fauces. ALDERSON, *Brit. Med. Journ.*, 1859, ii, p. 122.

36.—An apothecary's boy inhaled dust of acon. root. Numbness of tongue; difficulty of swallowing; dryness and sense of constriction of fauces. After one hour difficult breathing, diminished force and frequency of pulse; dilated pupils, loss of voice, prostration. Slight convulsions repeatedly for five hours; face Hippocratic; pulse 36 feeble; oppression in cardiac region. After two weeks, aphonia still continued. —ISAACS, *New York Journ. of Med.*, 1859, vol. vii, p. 191.

37.—Mixed pickles made with 1 lb. acon. root in place of horse radish. 1. A lady, middle aged, took some at supper, 9 p.m. At twelve, vomiting and purging. Got some tinct. opii and recovered by morning.—T. O. WARD, *Brit. Med. Journ.*, 1860, p. 939.

38.—2. Young lady, at 9 p.m. took a little. At 12 numbness at tip of tongue, extending to base, with sensation of swelling, rigors, great depression, feeling of extreme illness. Got out of bed, but was so paralysed could not get in again without help. Felt as if dying, blindness, feeling as if eyes would drop from sockets, jaw dropped, had to have it tied up. Remained in much the same state during night and following day. Suffered most from terror and anxiety.—*Ibid.*

39.—3. A young lady, 18, dyspeptic, at 12 noon, took some of pickles and drank a teaspoonful of the vinegar of the pickles in which 1 lb. of acon. root had been soaking thirty-six hours. Soon taken ill.

Sickness without relief, tympanites, pain round waist, convulsive movements of legs, hands benumbed, cold and clenched, pulse slow, scarcely perceptible, seemed about to die. During one of these attacks pulse imperceptible, heart feebly audible, then had complete trismus and tetanus, hands clenched, arms fixed, jaws tightly closed, head and trunk retracted till she only touched couch with head and heels. Then the paroxysms became less severe till midnight. For several days suffered from severe pain in spine and great debility. Recollected little of what had occurred during violent paroxysm.—*Ibid.*

40.—4. A young man took some of the pickles at 1 p.m. His mouth soon filled with water. Had a depressed heavy look, face livid, staggered as if drunk, complained that legs felt swelled and too heavy to lift. Numbness about jaws, occasional attack of extreme depression and faintness, when face became livid and pulse feeble. Got brandy and ammonia without effect till he became sick when he began to rally, by bed time had nearly recovered.—*Ibid.*

41.—A young married woman took acon. root in pickles. Ten hours afterwards violent spasms and severe pains, with prickling in limbs, back and chest, difficulty of breathing and partial loss of sight, pulse considerably lowered, skin cold and clammy.—J. B. Brown, *Lancet*, 1860, ii, p. 344.

42.—A lady took two teaspoonfuls of tinct. acon. One hour afterwards felt strange sensations. Got zinc emetic, which acted well in two minutes. On trying to rise exclaimed, "I have no use of my legs!" Face pinched, anxious expression, forehead wrinkled between eyebrows, pupils slightly dilated, pulse 45, feeble and intermitting, extremities cold, consciousness unimpaired. Burning in fauces, constriction at chest, no feeling in legs, arms, or face. In eight hours was well.—J. W. Kay, *Lancet*, 1861, ii, 170.

43.—A gentleman suffering from painful affection of hip-joint swallowed a tablespoonful of tinct. acon., = 48 m. of tinct., at 7.50 a.m. Seen at 9.40, was supporting head, with a basin before him. Was prostrated, complained of languor, great sense of oppression or weight, inclination to yawn, feeling of dry heat and tightness of skin all over body, with numbness and tingling, commencing in feet and spreading quickly upwards; pupils normal but sluggish, pulse feeble and fluttering rather than intermittent, but soon began to intermit, the intermissions becoming longer until it ceased to be felt. Got emetic, which caused vomiting. 10.30 a.m.—Whole surface of body cold, especially feet and hands; lay on back, face livid, eyes closed, indifferent to everything, except when roused by vomiting; perfectly conscious, pupils slightly dilated, pulse not perceptible, heart's action feeble, irregular, intermitting, hardly any impulse heard, complained of weight in head and numbness of legs. Arom. sp. of amm. made him vomit. At 11 had a convulsion, transient; another at 11.15 (subject to epilepsy).—L. Atthill, *Dubl. Jour.*, xxxii, 1861, p. 14.

44.—A strong and healthy woman, aged 30, a martyr to rheumatism, chronic and sub-acute, took an overdose of a mixture containing Fleming's tinct. acon. on going to bed. Soon vomiting, numbness, and tingling of tongue, palms, tips of fingers and soles. Took another dose at 8

a.m. This was followed by sickness and vomiting, lasting till 11 a.m. Seen then: countenance pale and ensanguined, pupils widely dilated, muscular system so weak and relaxed could hardly stand or walk, pulse and heart's action slow and faint, respiration laboured, deadly sick, constant attempts to retch dry. Loud noises in ears likened to hundreds of omnibuses rolling past on every side. Very faint, thought was sinking, uncontrollable desire to lie down and sleep. Gave her an emetic of mustard and capsicum and wine and coffee. In one hour was quite well, only weak.—T. SKINNER, *Brit. Med. Journ.*, 1861, i, 360.

45.—A coloured boy, 5, took an unknown quantity of tinct. acon. Complained of throat, walked unsteadily, articulated with difficulty. When seen, hour and a half later, was comatose, eyes half closed, expressionless, pupils insensible, not much dilated, pulse feeble and irregular, respiration required artificial aid, muscles and ligaments so relaxed could not stand or sit without support. Respiration a gasp, five or six per minute, then he would convulsively straighten out, throw head and shoulders back, and hands over head as if to get a longer breath, then relax as before. Emetics and tickling fauces did not provoke vomiting. Respiration grew more difficult, pulse imperceptible, was sinking. Gave 3 drops tinct. nux vom., and pulse gradually returned. Then tickling fauces caused vomiting. Next day quite well. —D. D. HANSON, *Boston Med. and Surg. Jour.*, lxv, 1861—2, p. 155.

46.—A gentleman, aged 57, subject to spasm of breathing, took (instead of ipec.) a teaspoonful of Fleming's tinct. acon. In bed, after ten minutes felt very unwell and cold, then apparently fell asleep, but soon awoke, feeling seriously ill. Found lying on back insensible, stertorous breathing, pulse weak and slow. Woke up soon after conscious. On introducing stomach pump relapsed into insensibility. Soon after quite unconscious, could not be aroused, breathing slow, no stertor, but whistling sound caused by relaxation of lips and cheeks. Stomach pump again used, and he got slightly conscious but speedily relapsed, and coma became greater than ever. Breathing became slower, pulse imperceptible, died two hours after taking poison.—J. M. STRACHAN, *Ed. Med. Jour.*, vii, 1861—2, p. 259.

47.—A lady, 70, had taken lin. acon. Seen at 12 at night: was found breathing extremely slow and slightly stertorous, pulse very feeble, scarcely 40; extreme pallor, speechless from debility, expression intelligent, muscles of face feebly convulsed, also a leg and hand, about every two or three minutes. In spite of stimulants breathing and pulse got slower and slower, and at length seemed to cease. Amm. to nostrils restored animation. Thought her head many times the ordinary size. The liniment contained ℥j tinct. acon. in ℥viij.—O'CONNOR, *Dubl. Jour.*, xxiii, 1862, p. 224.

48.—Daughter of last case, 40, had drunk a wine-glass of lin. acon. Violently convulsed in face and upper extremities, countenance pallid, expressing great misery, pulse sluggish, not feeble. In a few minutes vomiting came on, and she awoke as if from profound sleep. Soon after this breathing slow, pulse 40, with difficulty roused, vomited freely. Then said she was totally blind: pupils not much, if any, dilated, insensible to strongest light. Complained of horrid dreams, a

dreadful sensation at pit of stomach, not pain. Slept in spite of slapping, ammon., &c. This ended in a convulsion; this succeeded by vomiting and perfect restoration of consciousness. In sleep pulse fell to 20, when roused rose to 40. Great desire for cool air, which gave relief. At 4 complained of acute agonizing pain in back of neck and base of brain, violent permanent spasm in both arms and fingers. Her agony, mental and bodily, was extreme. At from five to seven hours after poison fits of vomiting, after which sight returned, and every symptom of illness disappeared, except languor.—*Ibid.*

49.—A young lady, with facial neuralgia. Tincture applied to face with feather. Soon complained of numbness commencing at toes, increased and crept upwards gradually till whole body was affected by it, slight muscular twitchings and nausea, fear and anxiety great. Whole body became cold; was put to bed; got wine punch, strong tea and coffee, and hot water bottle to feet. A hot bath. Did not quite recover till next morning.—BELCHER, *Dublin Jour.*, xxiv, 1862, p. 476.

50.—A man, aged 42, took an unknown quantity of acon. tinct. about 10.15 p.m. Immediately retched and vomited. Seen shortly afterwards was still retching violently; intelligence perfect, face pale, skin cold, clammy; pulse small, hardly perceptible, heart's action very feeble. Pupils much dilated. Breathing quiet between fits of retching. Staggered on attempting to walk; no power to raise arms. Said, "Oh my heart!" (pretended he had heart disease). Said, "I lost my eyesight just now, but can now see plainly." Sleepy, dozed and woke up, saying he had delightful dreams. Eyes became fixed and very brilliant and sparkling, pupils extremely dilated. Asked for writing materials, but could not finish what he wished to write. A quarter of an hour before death lost all power and sensation in limbs, sharp pinches produced no impression, but cold water dashed in his face caused him to shrink; pulse imperceptible; no convulsions; extreme relaxation of limbs at death, which appeared to come on from syncope, an hour and three-quarters after taking the poison. *Post-mortem.*—Extreme rigidity of muscles, erection of penis and escape of semen. Vessels on surface of brain turgid, little fluid in ventricles, none at base of brain. Heart healthy, right side distended with dark fluid blood; left side contracted and empty. Lungs congested posteriorly. Inner surface of duodenum reddish and injected. Capillary congestion of lungs and of stomach, which was bright red; marks of irritation, with softening aud separation of part of the mucous membrane, which was all highly congested.—A. S. TAYLOR, *Guy's Hosp. Reports*, 1864, vol. x, p. 187.

51.—A girl, æt. 17, five months pregnant, swallowed at 9 a.m. seven ounces of Fleming's tinct. acon. Very soon pains shooting through head, peculiar tingling sensations through whole body; arms and legs benumbed; choking sensation; tightness in head, with partial loss of sight. After drinking milk walked with unsteady gait about half a mile. Went to bed, and soon became restless and delirious. About 11 a.m. lay in bed on back, limbs drawn up. Swallowed with difficulty. Conscious; features pinched; dark ring round eyes; pupils slightly contracted; skin covered with cold clammy sweat;

breathing hurried and short; pulse 45, scarcely perceptible at wrist; paroxysms of choking; great thirst. After a zinc emetic and large draughts of tepid water got better. Next day, though she had passed a restless night with disturbing dreams, was better; pulse 60, soft; breathing 30. Slight headache and burning pains in stomach and bowels, both tender on pressure; tongue dry and slightly coated; pupils normal.—EASTON, *Lancet*, ii, 1866, p. 34.

52.—A man, æt. 61, drank a teaspoonful Fleming's tinct. acon. Immediately burning in mouth and throat, and soon afterwards in stomach, accompanied by numbness and tingling of lips and tongue. After half an hour vomited freely, and half an hour later complained of numbness and weight in extremities, which were very cold, and he could not raise them from ground. Soon breathing became hurried and laboured; retained consciousness, though rambled occasionally; pain running from head through all limbs. Bowels purged at 4 p.m.; brought to hospital at 6 p.m. Lying on a table in waiting-room, face flushed, conjunctivæ injected, hands and feet cold and clammy; resp. laboured, 36; pulse small, soft, 80. Heart sounds feeble; mouth and beard wet with frothy saliva; pupils dilated; complained of burning in mouth and pain in epigastrium; very restless, frequently drumming table with feet; said they felt like two heavy weights. Hot bottles, brandy and coffee. Vomited everything. 9 p.m.—Lies in sleepy state, but can be easily aroused; pulse 92, stronger; resp. easier, 32; complains of pain in stomach, but there is no tenderness; numbness and weight of extremities less felt; pupils normal. Next day.—No vomiting since 10 p.m. yesterday; complains of headache and numbness; cramps in legs and arms; slept fairly. Gradually recovered.—JOHNSON, *Lancet*, 1867, i, 238.

53.—A Mahomedan took acon. root by mistake. Immediately tingling of lips and tongue, numbness of face, vomiting, extreme sleeplessness, tossing limbs about, constantly changing position. Burning in stomach, tingling and numbness all over body, except legs. Retching and vomiting; placed hand on heart. Face anxious, eyes suffused, lips pale, eyelids swollen, pupils somewhat dilated, insensible to light; respiration laboured; pulse small and feeble, 66. Unable to walk owing to loss of volitional power over muscles. Consciousness perfect; sensibility of legs impaired.—ROY, *Indian Med. Gaz.*, 1867, fas. 1.

54.—A man, aged 58, at 9 p.m. took a cut-up aconite root. At 10 p.m. made a horrid noise as if in a fit. He was found in convulsions. Salt and water caused vomiting. The next two hours had repeated paroxysms at intervals of twenty minutes. Each fit lasted several minutes, was ushered in by shuddering noise, the arms became rigid or were raised above head, which was thrown back, and lower limbs extended rigidly. Features distorted to one side or other, eyes closed, no general convulsions; surface covered with profuse sweat; face pale; consciousness unimpaired; could not speak owing to spasms of respiratory muscles. During intervals spoke quite well. At 12.30 a.m. paroxysms ceased; became collapsed; surface cold and moist; pulse almost imperceptible, intermittent, pupils dilated; intelligence perfect. Died at 1 a.m. *Post-mortem.*—Brain not congested, except

arachnoid covering of convolutions slightly; slight excess of liquid in ventricles. Heart: left ventricle firm and resistant, right flaccid, right ventricle empty; blood fluid. Lungs crepitated, vascular emphysema; when cut exuded much frothy sero-sanguinolent fluid; bronchial mucous membrane congested, more rugose than normal. Mucous membrane of tongue redder than normal at base; mucous membrane of upper part of œsophagus redder, but reddest at lower end; longitudinal rugæ more marked than normal, solitary glands large and projecting; mucous membrane of stomach intensely congested, most so at greater curvature, where it was like capillary extravasation; duodenum intensely congested at pyloric end, progressively less so downwards, congestion entirely ceasing at upper end of ileum; transverse colon congested; liver, spleen and kidneys congested.—SANDERSON, *Trans. Path. Soc.*, 1869, x, p. 285.

55.—A young lady, aged 25, at 11 a.m. swallowed two tablespoonfuls of acon. lotion, containing ʒiss of tinct. acon. At 12.30 alarmingly ill, staggered; benumbed feeling in lower half of back, then in face and head; tingling in mouth. Head felt distracted as if from the pressure of a vice; distressing tightness across nose and eyes. In a few minutes legs became so weak, and such a tremor came over her that she could not stand alone. Fainted three or four times on trying to sit up. Benumbed tingling of upper and lower extremities commenced about 1.30 p.m.; vision imperfect, blackness coming over sight. Severe vomiting came on and lasted incessantly till 7 p.m. Face pale, pupils largely dilated; extremities icy cold. Vomiting and eructations; dreadful benumbed tingling in legs, arms, head, face, mouth, head as if compressed in a vice; pulse scarcely perceptible; heart's action weak and irregular. In spite of brandy, which was vomited, was pulseless at 6.30 p.m.; extremities as cold as death; pupils much dilated; intellect unimpaired. Injected ʒss of liq. ammon. hypodermically. 7.10 p.m. Vomiting less frequent; collapsed and cold, forehead covered with sweat, eyes glassy, pupils dilated. Tongue pale and contracted; no pulse, intellect unimpaired. More ammonia injected. 7.20 p.m. Less vomiting, pulseless at wrists, complains of compressed and distracted feeling in head, pupils still dilated. More ammonia injected. 7.25. p.m. Pulseless. More ammonia injected. 7.30 p.m. Weak irregular thready beating of radial artery, which gradually became stronger. 8 p.m. Pulse fully established, but irregular; vomiting nearly ceased; extremities warming. Tingling of extremities continued till 12.30 next morning, that of lower lip lasted six days.—B. W. RICHARDSON, *Med. Times and Gaz.*, 1869, ii, p. 709.

56.—Mrs. M—, aged 31. Had urethritis, for which hyos. was prescribed. Took by mistake twenty-five drops fluid extract. acon. at 8 p.m. In half an hour it was announced she was dying. Was pale, dilated pupils, cold extremities, pulse very feeble and slow. Alternate relaxation and spasm of muscular system, and respiration much retarded, subsultus tendinum or rather wild movements of arms and hands, complained of intense thirst, severe burning pain in stomach, vertigo, headache, dry throat, said could not swallow or speak, that the room was quite dark, numbness, difficulty of breathing. An emetic caused

feeble vomiting. Gave stimulants and sulph. morphiæ, half grain every half hour. Sinapisms applied. At 11 p.m. vomiting ensued. At twelve, general improvement. Gave morphia at longer intervals. Gradually recovered.—H. W. Brown, *Boston Med. and Surg. Journ.*, lxxxiii, 1870, p. 41.

57.—A man, while drunk, took an unknown quantity of tinct. acon. Seen about an hour and a half afterwards was stupidly drunk; pulse of fair volume and strength. Extremities warm. An emetic caused free vomiting and evacuation from bowels. After half an hour failing circulation, pulse rapid and feeble, feet and hands cold. On his head being raised alarming prostration came on, breathing laboured, pulse irregular, intermittent, finally imperceptible; much frothy mucus from mouth and nostrils; skin dusky, cold clammy sweat in face and forehead; inability to swallow. 20 m. of tinct. digit. injected subcutaneously; galvanism applied to cardiac region. Patient rallied and gradually recovered.—Dobie, *Brit. Med. Journ.*, 1872, ii, p. 682.

58.—A chemist's porter, aged 21, brought to Middlesex Hospital at 5.30 p.m., half an hour after having swallowed ℥j of Fleming's acon. tinct. Immediately vomiting; this was increased by an emetic of sulph. of zinc and strong coffee. He was in extreme collapse, countenance anxious, skin cold, pupils normal, could hardly articulate, retched violently, pulse quick, almost uncountable, heart's action tumultuous, the two sounds scarcely separable. Stomach washed out and stimulants given. Put to bed. At 6 p.m. quite conscious, very restless, constantly turning in bed, expression anxious, apparently suffering pain and great mental anxiety. Face dusky, body cold and clammy. Great difficulty of swallowing fluid, which ran out of his mouth, unable to articulate; spitting large quantities of frothy saliva. Heart acting tumultuously, systole and diastole inseparable to ear; pulse of fair size, uncountable, very weak and unequal. Pupils of moderate size. After half an hour could answer questions, threw himself about violently, attempted to bite attendants. Pupils growing larger. Passed a motion in bed. Shortly after became delirious, pulse not felt at wrist, became more and more violent and restless. At 8.30, after struggling considerably, pupils dilated, heart ceased to beat, two or three imperfect respirations. Died in syncope. Urine sp. gr. 1023, normal in colour, very acid, precipitating phosphates, no albumen. *Post-mortem* seventeen hours after death. Rigor mortis very well marked; left pleura adherent, right normal; dependent portion of lungs engorged and œdematous. No fluid in pericardium. All the cavities of the heart contained fluid blood, some black clots in right side; left ventricle under the influence of rigor mortis. Small intestines pale rose colour. Liver congested. Mucous membrane of stomach congested, reddened, studded with ecchymoses at cardiac end; mucous membrane covered with a layer of yellow mucus. Spleen much congested. Kidneys intensely congested. Dura mater much adherent to skull, ℥ss of clear serum in ventricles and base of skull; sinuses filled with dark fluid blood; veins in floor of fourth ventricle much congested. *Brit. Med. Jour.*, 1872, ii, p. 579.

59.—Mrs. G—, attending dispensary for pain in shoulder. On Jan 5th drank ʒiij of linim. acon. Immediately felt burning in throat and tongue; in ten minutes could not speak, and made a stertorous noise when breathing, and had a strangling sensation in throat. Face flushed over cheek bones, otherwise pallid. An hour and a half after taking the linim. was agitated and weak, pulse 84, skin cool; complained of burning at throat and stomach (she had vomited before this by an emetic). Pupils dilated. Next day burning sensation in throat and stomach continued; face flushed; pulse 80; urine normal; much milk secreted.—BAGSHAWE, *Pract.*, x, 1872.

60.—Miss C. D—, aged 65, took at 7 p.m. ʒj tinc. acon. root. Great numbness of all extremities, after one to two hours terrible choking sensation; pulse irregular, 60. At 10.45 pulse imperceptible; profuse cold perspiration, surface felt like a corpse; slight convulsions. At 11.15 p.m. apparently dead, no respiration or circulation, yet kept moving some part of body, and in less than an hour began to rally. By midnight pulse perceptible. Continued to improve, and by 9 a.m. only weak.—*Philad. Med. Times*, 1872.

61.—A young lady, æt. 19, had suffered from spinal irritation. Went to St. Moritz, where she could walk four or five miles. Pain recurred, and she went to Hastings. On 3rd November, after a walk in north-east wind, had pain in head and neck, chiefly left side. Morphia hypodermically and tincture of chloroform and bell. did no good. Next day weak, pain along left occipito-cervical and trigeminal nerves. Acon. tincture was painted on twice (November 5th); it caused numbness and tingling of lips. 6th.—Tincture again applied as it drove away the pain. At 9 a.m. eyes and nose felt sore as if had cold in the head. At 1 p.m. burning soreness of eyes increasing, skin of neck numb, and lips tingled much. At 3 p.m. photophobia, left eyelid much swollen, conjunctiva injected, its vessels enlarged, bulging, and tortuous, of a bright pink colour. Forehead, face, ear and neck hot to touch, right side cool. Pupils widely dilated; vision greatly impaired; could not read ordinary print. Lips dry; tongue projected to affected side; pulse 88. At 6 p.m. pain in eyes and photophobia greater, but no neuralgia. Ophthalmoscope showed art. cent. ret. distended, and retina congested. Sensibility greatly impaired where liniment had been applied (symptoms the same as those caused by section of sympathetic; secretion is blunted in parts supplied by nerve; nervous control over blood-vessels withdrawn; power of movement reduced).—BAGSHAWE, *Pract.*, xi, p. 21, 1873.

62.—A woman, æt. 29, had trigeminal neuralgia, for which acon. tinct. was painted on seat of pain. The pain was arrested, but next hospital day returned complaining of erysipelas. The parts that had been painted were swollen and bright; left conjunctiva congested with tortuous vessels; pupils contracted.—ANSTIE, *Pract.*, xi, 1873.

63.—A cabinet-maker about sixteen days ago had felt very unwell, suffering from influenza. At recommendation of friend took homœopathic tinct. acon. (dilution not stated) in two-drop doses with benefit. Sent to chemist for more. Got strong B. P. acon. tinct. Took four drops every four hours, then felt very excitable, with prickly sensation

over skin; this went off in two hours. Repeated dose, and felt low spirited and thoroughly miserable. Took five drops with return of despondency and prickly feeling, tingling hot feeling in throat, eyes restless, could not sleep, body burned with fervent heat. On attempting to work fell back on bench from weakness. Memory much affected; strange fancies possessed him; gave away a sovereign for a shilling; objects in the light seem to grow bigger and bigger. Left off acon. for two days, but strange feelings remained. Sent for more acon. A friend gave him four drops; two hours later took by mistake about fifty-five drops, and went to bed. Soon felt choking prickly sensation, with violent pain in stomach and bowels, as if a big needle were travelling through them; body seemed dry, and he felt as if it had been wasted (?); felt wretched and inclined to destroy himself. When seen next morning was highly delirious, talking all sorts of nonsense, imagining strange figures, goblins, &c., about bed, but rational at times. Mistook people, rambled incoherently. Shaking all over, but said he was warm; pulse 78; great oppression over cardiac region; fluttering in chest; headache; respiration at one time slow, then quick and shallow. Greatly exhausted; any exertion caused prostration, with quick shallow breathing, and diminished impulse of heart. Thirst, tingling in legs, arms, mouth, throat, and tightness in throat below larynx, which he said wanted cutting. At night in delirium attempted to cut his throat with a razor. Tongue large, thick, tremulous; sensation not much diminished; pupils slightly dilated, but sensitive to light; conjunctiva suffused; eyes looked brighter than usual. Was blistered, and got a stimulating mixture. Next day delirium continued; complained of difficulty of urinating; catheter passed brought away a great quantity of urine. Prostration and desire to commit suicide continued, always asking for a knife to cut something tight out of throat; tried to put a handkerchief and the bed hangings round his throat. Gradually recovered.—P. READ, *New South Wales Med. Gaz.*, vol. iv, 1873, p. 43.

64.—A young married woman swallowed ½ oz. of liniment acon. After a quarter of an hour emetic of salt and mustard caused free vomiting. Seen after one hour she had giddiness, numbness of legs, skin cold and clammy; face anxious, breathing laboured; pulse irregular, 130; pupils dilated. Perfect consciousness, but great anxiety, still vomiting; slight tingling in mouth and throat, sense of stiffness in muscles of jaw,; impending collapse. Got ammon. and brandy which she vomited. In half an hour complained of excessive cold; said she could not feel her feet. Gaze became fixed, pulse ceased, fell back in syncope. Revived by ammonia rubbed over heart; had two more such attacks. In one hour after being seen became suddenly delirious, threw arms about wildly, talked of dancing and sang a great deal. This lasted twenty-five minutes, and then she became rational. Shivering and numbness continued two hours, then temperature of skin got higher. Pulse lessened in number and became more normal in quality. Five hours after taking the poison had quite recovered.—NEILD, *Austral. Med. Journ.*, vol. xviii, p. 130, 1873.

65.—A young lady drank more than a drachm of acon. and chlorof.

linim. After stomach pump had been used complained of numbness of cheeks and tongue, rapidly extending over shoulder and back and down arms. Respiration embarrassed; said with difficulty, "All is dark now, doctor, I cannot see at all." Became unconscious. Within an hour breathing imperceptible, she was growing cold and pulseless; remained three hours without any trace of pulse in axilla. Artificial respiration was attempted to be kept up with Faradaic battery, but failed. Marshall Hall's method was then tried with success, and the electricity continued. 1st hour. Temperature in mouth 95·6°; cyanosis of face extending to nails. Oxygen given to breathe. After five hours from cessation of pulse, when only an occasional flutter could be heard at heart, and two hours of oxygen respiration a feeble thrill at wrist was felt. Five hours after the poison had been taken the electricity was left off, but had to be reapplied. To the numbness of skin succeeded hyperæsthesia. Could be roused by the slightest touch, but sank back when that was left off. When so roused gave a sharp scream and uttered some expression of distress. Kidney secretion almost stopped; a small quantity obtained was found loaded with albumen and casts. At 5 a.m. next morning the urinary secretion returned. She had natural sleep. Urine still loaded with albumen and casts, but this afterwards passed away.—J. Ellis Blake, *New. York Jour. of Med.*, xxi, p. 37, 1875.

66.—A man, aged 34, suffering from intermittent supra-orbital neuralgia. At 7.15 p.m. got by mistake an unknown quantity of tinct. acon. Ate a light supper, complained of numbness of lips, tongue and throat. Seen at 7.45 was very excited, sitting up in bed, but rational. Said his feet were prickling and numb as well as his throat which had lost all feeling; pulse 80 weak, profuse sweat, disturbed breathing, nausea. Got ipec. with draughts of warm water, which did not produce vomiting. Irritation of throat caused vomiting three times. Pulse became very weak, numbness, delirium, said he was dying, restless, jumping about, with difficulty kept in bed. He was then dosed with whisky both by mouth and rectum, nux vomica, digitalis and other things, which destroyed the purity of the symptoms. He died, nowithstanding artificial respiration when breathing failed, at 1.40 p.m. next day. Pupils at one time observed to be extremely dilated, at another right only dilated and immovable, left normal.—Waddel, *Cincinnati Lancet*, July, 1875 (quoted in *Med. Rec.*, vol. iii, p. 549).

67.—An elderly lady had been taking for some days (for neuralgia after shingles) a mixture of tinct. cinchon. and suc. conii, but tinct. of acon. had by mistake been substituted for the suc. conii. She had thus taken about 200 drops of aconite. The last dose taken one hour before dinner. At 1 p.m. was found sitting up in bed, anxious countenance, restless, rubbing stomach, nausea, præcordial uneasiness. Vomiting was excited artificially. Nausea, burning heat in mouth and lips, pain in gums, extreme restlessness, sense of prickling and numbness in trunk and limbs, followed by inability to stand or move, sensation of sinking, failure of circulation. These symptoms increased till 6 p.m. Then the upper and lower extremities became cold, bedewed with

clammy perspiration. Great pain in wrists, general numbness, want of power; felt as if had lost left little finger; pulse irregular and intermittent, irregularity both of rhythm and strength; cardiac sounds weak and indistinct; pulsation in left radial wholly disappeared, barely perceptible in right radial. Pupils slightly contracted; almost blind; intellect clear; tendency to sleep and slight stupor, but easily roused; slight subsultus at wrists; breathing occasionally irregular, with a catch followed by a sigh. At 8 p.m. began to recover, nausea ceased, but stomach remained irritable; sight returned, said the faces of her friends had no colour, but were livid and transparent; then general temperature improved, and little finger returned. At 9 p.m. pulse improved, next day well. For four nights "sleep disturbed by disreputable persons who assembled round her bed, especially an old lady who, starting out from behind the curtains with a large umbrella assumed a threatening attitude, causing her to wake with a scream." Sanguinolent discharge from bowels with frequent tenesmus.—THOMPSON LOWNE, *Edin. Med. Journ.*, April, 1875.

68.—A gentleman drank at 11 a.m. 2 oz. tinct. acon. root. In a few minutes appeared strange. Went out. Returned at 2.10 p.m.; went to bed; appeared drunk. Semi-delirious; very flushed face; intense dyspnœa; bathed in icy cold sweat; pupils widely dilated. Had walked to a friend's house, got a biscuit and wine, and returned walking. On his way felt as if his legs would give way under him, and vomited freely. Hot bricks in bed, extra blankets and brandy, and strong coffee; pulse not perceptible; heart sounds faintly heard. At 3.30 violent vomiting, got zinc emetic, which brought away grumous fluid. 4 p.m. delirium continued; great muscular prostration; no pulse at wrist; temp. 89°. At 4.30 castor oil, which soon acted; pupils widely dilated; great dyspnœa, almost suffocating him; rallied by sinapisms and rubbing and hot bricks. 5.30 p.m. tonic spasm, lasting considerable time; temp. 84°; pulse imperceptible. Hands and nails slate-blute. Hot coffee and brandy and water. At 12 heart sounds more distinct; diplopia; intense thirst; temp. 89°; no power over lower extremities; great tingling and numbness in arms; sleepy. Next day, 4 a.m., pulse perceptible at wrist; dyspnœa better; temp. 95·4°. At 9 some sleep, refreshing; conscious; saw double; pupils widely dilated. Recovered in two days; pupils remained dilated three days.—L. H. JONES, *Brit. Med. Journ.*, 1877, i, 258.

69.—A lady got four drops of root of acon. tinct. four hours after supper. She became delirious; general trembling; coldness. Seen at 2 a.m. was very cold; no trace of a pulse; skin icy cold; respiration irregular; consciousness present; she felt she should die; trismus very violent, coming on in fits. This lasted till 5 a.m., then she gradually recovered.—G. DE MUSSY, *Bul. gén. de Thérap.*, xiii, p. 326, 1877.

70.—Clara B—, 21, took 1 oz. of acon. linim. at 11.15 a.m. Immediately tingling in lips, mouth and tongue, teeth felt loose, lower jaw felt dead. Then tingling in fingers, extended all over body, and felt numb. Put fingers down throat, but could not vomit. No pain, felt cold, eyes dim, she shivered. On going down stairs legs felt numbed and heavy, and gave way under her. Fell down at bottom of stairs,

and complained of great difficulty of breathing. Seen at 11.30 was found hysterical; pupils dilated. Got zinc emetic, which acted freely. Sickness kept up by oatmeal and water. Felt stupid and dazed, but could recognise people. Then lost all recollection. At 12.40 p.m. complained of numbness and tingling, pupils dilated, twitching of muscles of neck and spasms of those of limbs. Admitted to hospital at 1.15 p.m., was found collapsed, body cold, pulse almost imperceptible, respiration weak and shallow, alæ nasi dilated, pupils widely dilated. Stomach-pump applied. After this could swallow coffee and brandy. At 1.45 p.m. became warmer, teeth chattered, pulse 75, small and feeble; respiration catching. Contraction of muscles of abdomen and thorax, causing her to spring up in bed. At 4.40 p.m. was quite sensible; soon went to sleep. Temperature two hours after admission 95·5°, four hours afterwards 99·8°.—H. Elliott, *Lancet*, 1878, ii, p. 917.

71.—A lady, æt. 24, took ½ drachm tinct. acon. After twenty minutes warmth in stomach, nausea, oppression of breathing. Then numbness, tingling, muscular weakness. Repeated dose in one hour (4.30 p.m.). Went off to walk two miles. About half way felt ill. On reaching destination began to stagger; soon completely prostrated. Voice very weak; complained of cephalalgia and lancinating pain in various parts of body, particularly joints. Seen at 6.40 p.m. Got an emetic, which was swallowed with difficulty; temp. 97·5°; pulse 32; resp. 10; pupils dilated; extremities cold; loss of consciousness; great pallor of face with expression of great suffering; twitching of mouth and eyelids. Vomiting ensued; retching continued; pulse became frequent and irregular; respiration more difficult. Injected 15 minims Majendie's solution of morphia, and she immediately had a slight convulsion. Spasmodic contraction of laryngeal muscles; respiration ceased; pulse imperceptible. She was a dying woman; cold to touch. Suddenly pulse sprang up, 40; laryngeal muscles relaxed; respiration began. Soon cheeks were flushed, and heat generally returned to extremities; temp. 98·5°; retching continued; pallor returned; general muscular tremor; pulse more frequent and irregular. 10 minims of Magendie's solution of morphia injected, and enema of carb. ammon. and brandy. Soon rallied; recovered consciousness; complained of cephalalgia, burning in stomach, severe pain in different parts of body. 10 minims more of injection at 10 p.m. At twelve she was asleep; passed water four times since 8 p.m. Next day complained of great muscular soreness, movement of body painful, very weak. 4 p.m. temp. 99·5°; pulse 72; vomiting ceased; little nausea; diuresis continued; complained of pain in kidneys, paroxysmal and transient. After three days complained of peculiar sensation at roots of teeth and diarrhœa, but gradually recovered.—F. H. O'Brien, *Med. Rec.*, New York, xv, 1879, p. 128.

72.—A gentleman swallowed a teaspoonful of linim. acon. When seen after five minutes was sitting up in bed, calm, and in full possession of faculties. No pain, only tingling and burning in mouth and fauces. Lips and countenance dusky; pulse 96, of good volume; no coldness. After an emetic of sulph. of zinc vomiting ensued.

Three quarters of an hour after swallowing poison complained of tingling in temples, with sense of enlargement of whole forehead and disturbance of vision. Pupils rather dilated. Mouth and fauces dry and burning. Heat at epigastrium and nausea. Coldness, especially of extremities; pulse 81, soft and feeble; bowels freely moved. Got champagne, and in one hour all the effects had passed off.—C. H. Hill, *Brit. Med. Journ.*, 1879, ii, p. 1019.

73.—A man, æt. 28, had swallowed 1 oz. acon. linim., equal to 1 oz. of the powdered root, three quarters of an hour previously. He had frothing at mouth, dryness of throat, shallow hurried breathing; pulse almost imperceptible; extremities cold; numbness and tingling of limbs; uneasiness at epigastrium; pupils normal; sphincters relaxed. Under stimulants pulse rose, but breathing remained quick and imperfect. In half an hour totally prostrate; vision weakened. Was sensible till one hour after admission, when he suddenly became convulsed, and breathing and cardiac movements ceased. Ammonia was injected without avail, and he died. *Post-mortem* 6 hours after death. Rigor mortis well marked; left ventricle of heart midway between contraction and dilatation; right ventricle and veins full of dark fluid blood. Lungs intensely emphysematous, pale in front, congested behind. Liver, kidneys, and spleen all deeply congested. Mucous membrane of stomach deep red and slightly granular, lined with tenacious white mucus. Cerebral vessels congested; fluid in ventricles increased.—H. S. Wood, *Austral. Med. Journ.*, n. s., vol. i, 1879, p. 283.

74.—A lady seen at 6.15 a.m. standing at washstand vomiting and retching with distressed and anxious manner. At five minutes to 6 had taken between 3 and 4 drachms of acon. liniment in half a tumbler of water, and retired to bed. In ten minutes had pain and uneasiness at pit of stomach and upper part of throat; then got worse, and sickness came on. Liq. amm. and milk injected. Pain in stomach and throat increased, became "horrible." Extremities became more and more cold, hands and fingers blue, also chin and jaw, but not lips. Countenance distressed, eyes glaring, pupils dilated. Pulse very feeble, scarcely perceptible, very quick and flickering, heart's sounds very weak. Could retain nothing on stomach. Vomited continually, first frothy matter, then viscid mucus, then frothy mucus tinged with blood, and subsequently bile. Injected ether subcutaneously, 15 minims. No effect. Again injected 15 minims. All symptoms becoming worse, in ten minutes injected 20 minims. Slightly improved pulse, but this did not last. In ten minutes injected 20 minims. In ten seconds there was excitement and delirium for a few minutes; pulse improved, became full and slower. Gradually recovered. The symptoms that lasted longest were the pains in stomach and throat. There was weakening of muscular power, but no convulsions. For some time a rigid state of muscles was induced by attempting to take hold of any thing. Intellect remained clear; urine passed twice; one stool.—T. Pike, *Lancet*, 1880, i, p. 12.

75.—A lady, æt. 33, took, on going to bed for a cold, three tablespoonfuls of Fleming's acon. tinct. Said she felt as if she were swelling.

Seen at 2.30 a.m. was gasping for breath, mouth open, tongue protruding, eyes fixed on vacancy, pupils much dilated; mustard emetic caused vomiting. Stimulants, hypodermic injection of digitalis, galvanism. Became insensible, pulseless, died in four hours.—NETHERCLIFT, *Brit. Med. Jour.*, 1881, i, p. 64.

ACONITINE POISONINGS.

1ª.—A gentleman swallowed about 2 grains aconitine. Seems to have fallen almost immediately and struck head against something. Immediately violent vomiting, floor covered with vomited matter. Seen about 2 p.m. (about eight hours after poisoning) patient fearfully collapsed, surface cold and sweating, pale, heart's action scarcely perceptible, pupils acting to light, no paralysis of sensation or motion, intellect unimpaired. Repeated vomiting of brownish fluid. Vomiting peculiar—patient seized with a general spasm, during which turned convulsively on abdomen, and with intense action of abdominal muscles jerked out contents of stomach with a loud shout, produced apparently by sudden contraction of diaphragm. These paroxysms recurred every one or two minutes. On attempting to swallow any fluid a painful spasm of throat occurred like that in hydrophobia; not produced by sight of water, but by touching him abruptly. At 9 p.m. pulse easily perceptible, but weak; hydrophobic symptoms continued. Fearful night of exhaustion and spasm, but intellect perfect. Was convalescent at 2 p.m. next day.—G. BIRD, *Lancet*, 1848, i, 14.

2ª.—H. L—, labourer, was given, for a periodical hemicrania (he being otherwise well), a solution of nitrate of aconitine in tincture of chenopodium, which he was to take in increasing doses. March 14th, at 7 p.m., took five drops (= gramme 0·0004). Complained immediately of constricting and burning sensation extending from mouth to stomach. Feeling chilly, went to bed. At 9 p.m. took twenty drops, and experienced same sensation more severely. A quarter of an hour later felt very sick and complained of fear that he would die; an ice-cold sensation creeps up from his feet; in the præcordial region an oppressive sweat; he cannot see any more; is dizzy and deaf. Fifteen minutes later he vomits copiously, with gradual decrease of all the symptoms, and sleep followed. During the whole time he felt fearfully exhausted as if he were paralysed, with great difficulty of breathing. His wife says that his breathing was audibly rattling, but that consciousness was undisturbed. No urination during the night nor any inclination thereto. Next morning he felt tolerably well, and took a cup of coffee and an egg without any inclination to vomit. At 8 a.m. took twenty drops, and shortly afterwards the same symptoms reappeared. He grew cold, had sensation of anguish in the præcordial and gastric region, breathing oppressed, was deaf and blind, and felt great malaise. His wife says that twitchings and spasms over the whole body set in, especially in the face. Twenty minutes after taking the dose spontaneous vomiting occurred, with relief

of all the symptoms. At 11 a.m. twenty drops; same symptoms. With every dose the state during the intervals became worse. He felt continually weaker and more exhausted, with all energy lost, and sense as if paralysed. In the afternoon again twenty drops, with the same result. Increasing constriction of mouth and fauces after the doses. At 9.30 p.m. again twenty drops. Though the medicine was always diluted with water, he drank now an extra quantity of cold water to prevent vomiting, and did not throw up the dose. He went to bed, and soon fell asleep. Sleep restless, rather a slumber only. Between eleven and twelve he felt very sick, and called out, full of anguish: "So chilly, my chest, my chest, I feel awfully chilly, what shall I do? I am poisoned." Now genuine convulsions in the hands, arms and face set in. He was totally blind and deaf. His eyes were closed, his lips dry and fissured, his tongue stiff, he could not open his mouth, he felt chilly and as if dying; breathing became rattling and moaning, quick. More severe convulsions alternated with quieter intervals, His wife prepared a strong infusion of black tea, and gave him during half an hour nearly half a litre of it mixed with milk as hot as possible. At first he could hardly drink, as the mouth was closed, and swallowing difficult. His taste was entirely gone, so that he did not know whether the tea was hot or cold. Five minutes after drinking it he vomited copiously, with great rattling in his chest. All this time he remained perfectly conscious. About fifteen minutes after having vomited he felt some relief. With every subsequent vomiting, aided by the copious draughts of hot tea, the amelioration increased and his chest felt more free. The symptoms gradually abated, and for an hour he enjoyed a quiet sleep with easy respiration. On waking he complained only of weakness. He passed no urine during the night, though he tried to do so towards morning. He took at 6 p.m. ten drops only. He immediately lost all taste; the burning in mouth and stomach returned; he felt chilly—in short all the symptoms returned, only in a more moderate degree, till vomiting fifteen to twenty minutes afterwards again brought relief. No more medicine. L— further affirms that he felt during the intoxication a heaviness as of lead all over the body, always relieved by vomiting. During the entire poisoning his colour was cadaverous. On the 17th he still complained of a burning constricting sensation in mouth and fauces, his taste altered, and his vision unusual. A few days later complained of more difficulty of breathing; his taste is not as good as usual, and the teeth are more sensitive when biting. The urine also passes only in drops, and less easily. No more hemicrania.—BUSCHER, *Berl. klin. Wochensch.*, 1880.

3ª.—N—, aged 62, of good constitution; never sick save some slight colds. After having felt well the day previous, took an unknown quantity of aconitine, went to bed March 20th, 1880, feeling unusually cold, and later felt an anxious pressure on the chest. An hour later, his wife heard him moaning, and found him in spasms, though fully conscious. As his state grew worse, Dr. Buscher was called at 3 a.m. He found the patient in bed, very restless but quite conscious. Skin very pale, and cold, especially in the extremities, which are bedewed with cold clammy sweat; radial pulse

very small, irregular, dicrotous, sometimes it can scarcely be felt. Sounds of heart only heard at apex, and scarcely distinguishable; heart's action very weak, irregular and quick. Breathing very laborious, short, very irregular, superficial, sometimes forty per minute, a few minutes later much slower. Pupils contracted, with sluggish reaction; features spasmodically distorted, especially about the mouth (facies hippocratica); swallows without difficulty; patient complains of terrible præcordial anguish; throws himself continually around in the bed; conscious; very irritable and quick in his replies. During observation of the patient, a sudden change took place. The extremities turned colder; heart sounds and pulse disappeared. His skin turned of a marble colour, the face somewhat turgescent, the pupils dilated, the conjunctiva became injected, the whole body bathed in cold, clammy sweat; breathing more laborious and superficial; tracheal rattling set in; a peculiar, clear, short moaning is heard. Beginning in the fingers, then in the face, tonic spasms, trismus; after a while, clonic convulsions over the whole body. Consciousness is lost. This convulsive paroxysm lasted about five or six minutes, during which we expected his death every second. It then abated; the skin took on a better colour; a warmer sweat occurred; the pulse could again be felt; the sounds of the heart became more clear, and its action, though irregular, at some moments was full and strong. Consciousness returned; he opened his eyes and said, "I must have slept and had bad dreams." He tried to remove a mildly burning night light, as the light felt disagreeable. This amelioration lasted fifteen minutes (though the præcordial anguish and chilliness continued), and then the convulsions returned in the same manner as before, followed by relaxation with the same phenomena. During this attack respiration nearly stopped; and the pupils were found insensible to light. Fully conscious again, he replied to the question how he felt: "Pretty fair, only I feel a terrible anguish in the stomach and heart, and it is dreadfully cold." The anguish he believed to be diaphragmatic. No other pain; of his whole body he feels only these regions and his head, all other parts seem as if filled with lead; no headache or vertigo, only some deafness. Immediately after taking a large cup of strong coffee, copious vomiting. A second cup, shortly after taken, remains, as also ether given in full doses and strong Spanish wine. Vesicants and sinapisms along the medulla and on the extremities. Another exactly similar convulsive attack occurred, but lighter and shorter than before. With rsturning consciousness he complains now of deathly lassitude. Requested to state his sensations before the convulsions set in, he replies: "I get colder and colder, become blind and deaf, I feel as one sleeping and dreaming." Now continuous severe vomiting occurs, during which the convulsions decrease in duration and strength, and the intervals of relaxation lengthen. At 5 a.m. the danger seemed to have passed, and at seven nothing remained but some præcordial anguish and sensation of coldness, with slight spasms. At ten, after a refreshing sleep, he awoke well. He did not urinate till noon, when 200 grammes of dark colour, were passed.—*Ibid.*

4ª.—Dr. Meyer took fifty to sixty drops of a solution of nitr. of

aconitine, was found dead five hours after taking the dose.* *Post mortem*, forty-three hours later. The body was strikingly pale and the jaws firmly closed. Diaphragm on both sides reaches fifth rib; muscles of a bright red colour; omentum pale and anæmic; cæcum partly filled with gas, partly with solid and fluid contents, its colour pale, no injected vessels visible. Duodenum from below upwards more injected, of darker colour as it approaches the stomach, but the mucous membrane intact. Interior of stomach strongly hyperæmic and brightened from the intense vascular injection. The spleen of twice its size, of dark, nearly black-red colour. Incised it is full of blood, soft and friable. Liver enlarged, exterior smooth, dark, the posterior part nearly black-red colour. Incised it is seen to be full of blood, but otherwise normal. Kidneys equally hyperæmic. The fluid contents of the abdominal cavity thin fluid and of bright cherry red colour. The right ventricle holds much bright red thin fluid bood; coronary arteries full of blood; in the pericardium much bloody serous fluid. The very voluminous brain even in its membranes very hyperæmic: sinuses full of thin bright red blood. In the hemispheres sub-arachnoid extravasations here and there. The grey substance of the brain shows on surface of section small red blood points, the whole very hyperæmic, less so in the medullary substance.—*Ibid.*

Aconite Provings.

I.—Dr. F. H. Arneth took, 26th February, 10 drops fasting. Some hours afterwards 20 drops tinct. acon. Nothing felt but burning on tongue. 21st, fasting, 15 drops. Immediately burning on tongue, great pressure and sometimes shooting in anterior, not superficial parts of eyeball. 22nd.—Morning and evening 20 drops. 23rd.—At noon 30 drops. Almost immediately the same pains in eye, occurring several times during day. From 26th (though no medicine was taken since 23rd) signs of a chill, severe coryza, shivering over back, especially in evening; slight oppression of breathing, with slight pressure under sternum, sometimes flying heat, quick, rather full pulse, &c.; nights very restless, with vivid dreams of things that happened during the day. 28th.—Morning and evening 25 drops. Moderate increase of all the described symptoms. 29th—In forenoon 40 drops. Besides the above symptoms, immediately after taking the medicine some pinching about navel, as after taking manna, soon followed by easy, painless diarrhœa; later pressive pain on right eyebrow. Towards evening the febrile symptoms increased greatly, for which he took (not knowing the medicine he was proving) some drops of acon. 7. The next night restless, with dreams about his patients. Feeling no better he took on the morning of the 30th some globules of acon. without relief. The febrile state lasted till 8th March, with all the previous symptoms. On 7th March the difficulty of breathing increased, especially on left

* The alkaloid used in these cases (2^a, 3^a, 4^a) was Petit's, which is (it seems) 170 times stronger than Friedländer's—the latter being intended by the prescriber. Hence his patient's (2^a) peril and his own death.

side of chest in cardiac region, with intermitting pulse, five beats were always hard, full, in rapid succession, the sixth was an intermission. This lasted all day. He got pale, emaciated, his gait and whole appearance betokened illness; and this was observed by others. Burning along urethra when urinating. 9th.—Feeling of shortening of tendons in hough, pain in left patella as from a bruise. This lasted the 10th and 11th. On 12th, for more than ten minutes, a peculiar feeling in eyes, like that felt by amaurotics in first stage, a warmth and undulation in both eyes, with involuntary half-closure of lids, and though the room was quite light, he felt as though he could not read for want of light, he could read however. 13th.—Slight drawing in right shoulder that went off by noon, but was followed by tearing and drawing, with lameness in head of left humerus for two days. 15th.—Feeling of shortening of both tendones Achillis, he had a difficulty in standing quite erect after sitting some time, the knees gave way. This lasted nearly three weeks, and only went off on 5th April. On 5th April took in morning fasting and about noon, each time, a tablespoonful of 3rd dil. Immediately pressive pain in frontal region, especially above right eyebrow, with dread of being shaken while driving. The same after two like doses next day. 7th and 8th.—In morning fasting and at noon a tablespoonful of 2nd dil., and on 9th and 10th as much of 1st dil. Nights very restless; he dreamt of things that had occurred long ago, bnt of which he had not thought for years, so vividly, that after waking they were still before his eyes. Next morning always confusion of head and blowing bright red blood from nose. On 10th some confusion of head. He took nothing more, and felt thenceforward quite well. On 20th took fasting 50 drops of tinct. No symptoms. 21st.—60 drops tinct. Blowing of blood from nose, pressive pain in head. 22nd.—80 drops. Eruption of vesicles on both temples, restless night. 23rd.—100 drops. Blowing blood from nose, violent twitching of extremities on going to sleep, which woke him up; restless night. Yesterday and to-day immediately after the dose, violent inclination to vomit, which was allayed after breakfast. 24th.—130 drops. Immediately violent inclination to vomit, lasting till after dinner (4 p.m.), and great confusion of head. After this no more medicine and no more symptoms.—*Oest. Ztsch. f. Hom.*, vol. i.

II.—Dr. Bohm had suffered some years previously from hæmoptysis, and after great exertion still occasionally sees traces of blood in the sputa. He took on 3rd Feb. 5 drops of tinct. acon. on sugar. Immediately burning, acrid, dry feeling on soft palate and fauces, not going off after breakfast, and causing frequent empty swallowing. After 1 hour frequent empty eructation with sourish taste; tickling in larynx causing cough. At noon want of appetite, empty eructation; after eating, discomfort and pressive feeling in scrobiculus cordis and upper abdomen. Towards evening hunger; frequent stitches in middle of sternum, with very cheerful humour. Sleep at night though uninterrupted, appeared so light and superficial that in the morning, though he did not feel tired, he thought he had not slept at all. All the symptoms, except those of the digestion, lasted on the 4th, and at

night he felt as if he slept in the air and had no firm support. 7th.—At 4.30 p.m. 10 drops in water. Immediately empty eructation, slight pressure in stomach. After three hours dry feeling in fauces, with much thirst, as if the water did not sufficiently moisten the surfaces it touched. Feeling of weariness and exhaustion in chest, though he talked little all day; slight fatiguing cough. 8th.—After coughing hawked up mucus streaked with blood; on posterior surface of sternum a constant feeling of soreness all day, as though he had been struck; in evening greatly increased warmth of palms and cheeks. Went early to bed, and could with difficulty fall asleep on account of great excitement, which he sought to allay by drinking much. Next morning, after light sleep, not rested; all day burning in eyes. The sensitiveness of chest lasted, with gradually diminishing intensity, during the evening and night fever till 12th February. By 13th he was quite well. 22nd.—At 6 p.m. took 4 drops, without symptoms. 27th.—In morning, fasting, took 30 drops on sugar. Soon afterwards burning on both sides of tongue, as from aphthæ; dryness on soft palate and constriction in gullet, not going off on drinking cold water. This lasted till afternoon and interfered with speech. Constant flow of saliva into mouth, and frequent risings from scrobiculus cordis, he feared nausea or vomiting. Distaste for wheaten bread. Frequent attacks of giddiness when walking and driving. Walking and speaking tire him, he feels very exhausted. At noon anorexia, tongue like leather, prostration in evening, increased heat of skin, flying stitches along sternum and between ribs; he must go early to bed; sleep restless, broken, not refreshing. Though he had drunk much did not urinate at night. In morning urine red, and when passed burning in orifice of urethra. 28th.—Better after breakfast, but at 11 a.m. violent rigor spreading over back and chest, also recurring very disagreeably on the least movement during the subsequent great heat (with frontal headache). A violent cough with sharp stitches in various parts of the thorax compelled him to lie always on his back, as lying on either side aggravated it. In evening as if stupified and very cross; at night restless, sweat after midnight with relief; urine as yesterday. 29th.—Though still exhausted and looking ill went about his business. At 3 p.m. a repetition of the febrile attack; but the chill is weaker than yesterday, the heat more moderate, pulse quick, 96, frequent cough with shaking pain of whole chest, expectoration occasionally brownish red, rust-coloured; sleep better, perspiration profuse, towards morning great relief. 1st April.—After constipation for three days, a normal stool; more frequent micturition, cough rarer, less painful, appetite normal. In afternoon attack of chill and heat, not lasting long. Night good. From this time the fever disappeared. For some days pressive pain in forehead and drawing pain in right upper arm.—*Oest. Ztsch. f. Hom.*, l. c.

III.—A. Br—, a healthy peasant girl, very robust, aged 22, took on successive days 5, 10, and 20 drops of tincture without effect. On the 18th January took 30 drops; confusion of head, feeling of heat in the evening. 19th.—40 drops; after two hours confusion of head, sometimes changing into heavy feeling and pressive pain in crown and fore-

head ; loathing, nausea, general malaise with painful heaviness in limbs. After five hours pressive pain in scrobiculus cordis, dry feeling in mouth, great thirst. Felt so unwell, head so confused, giddy, and painful, limbs so heavy, that had to go to bed. Face hot, hands and feet cold, pulse contracted, hard, moderately quick. After nine hours, pressive pain in forehead, face turgid red, eyes sparkling, dry feeling in mouth, tongue moderately moist, slightly furred, no appetite, great thirst, oppression of chest, shallow quick breathing, with frequent deep breathing and sighing. No pains, but heaviness and fulness in chest, anxiety and palpitation of heart. Heart's beats strong, pulse fuller than usual, hard and strong, at same time moderately quick, skin warm, urine clear and reddish. After twelve hours heat and restlessness increased, tosses about from one side to another. In right thorax some pressive pain. After sixteen hours (9 p.m.) more tranquil the last hour, general warm sweat. Headache, throat, and breathing difficulties relieved. Pulse large, soft and slow. Only confusion of head and perceptible beating of heart complained of. 11 p.m.—Sleeps sound and quietly. No stool since yesterday morning. Ate nothing all day. 20th January.—Slept quietly all night, skin moist on waking. Somewhat fatigued and head rather confused, this went off during the day. —HENCKE, *Archiv f. Hom. Heilk.*, XX, 1.

IV.—H. Dworzak took from 0·1 to 0·2 grammes of extract acon. neom. Felt peculiar sharp taste, followed by a violent shooting pain from lips to stomach. Immediately violent eructation with rumbling in bowels, head and face very warm, pulse quick, lingual and buccal mucous membrane red, studded with small whitish-yellow vesicles, surrounded by bright red areola ; salivation came on ; eructation more severe ; loathing ; inclination to vomit ; pulse slower ; vomiting. On taking the extract in a wafer so that it did not come in contact with mucous membrane of mouth there came on : rumbling in bowels and eructation ; head became confused ; a tensive drawing sensation in course of trigeminus, which gave place to a shooting wandering pain, often interrupted, but afterwards continued. Pulse begins to sink, becomes irregular, small, and weak ; confusion of head increases ; prostration ; exhaustion, drowsiness, and dull pain in interior of skull. Pupils at first very mobile, became persistently dilated ; vision dim, and he is not able to look at a highly-illuminated object without winking ; near and distant objects seem to swim. About forty minutes afterwards a peculiar formicating sensation on tongue as after taking peppermint. This spreads over lips, back parts of mouth, fauces, goes into tips of fingers and toes and into face, and thence spreads all over body. Increased secretion of saliva ; skin becomes cold, harsh. The dry formication always increased ; excited sensation of distortion of features and extremities, constriction of body. Extreme restlessness ; it tickles him up, and impels him to be in constant movement. Is better in equable temperature, but is increased on coming from cold into heat and *vice versâ*. The headache and confusion of head gradually diminished two hours after taking dose, but then came on uncommon exhaustion and weariness, oppression and anxiety ; he must often yawn ; respiration became more difficult and slow, with

feeling as if throat and chest were constricted; pulse becomes always more irregular, and sinks to half the normal, often intermits, and is sometimes dicrotic. The exhaustion became so great that he could not stand, but is obliged to remain lying; anxiety increased, with apathy, indifference to all the world; pulse and heart's beats are sometimes gone for several seconds; respiration a gasping for air; skin always dry and icy cold; taste and sensibility diminished; on the parts where the formication left off occurs a furry feeling as in a finger tightly tied with a thread; subsultus tendinum; involuntary stretching out of limbs. At same time constant nausea, loathing, inclination to vomit, and, at length (after two hours), repeated vomiting, with relief; pulse regular; respiration more frequent, more regular; the anxiety and oppression diminish; body becomes warmer. Formication goes off quite; instead there is a kind of insensibility of skin, furry feeling. Head not so painful and confused; rather dazed and empty, as in drunken somnolence; the exhaustion continues; vertigo on rising up; flickering before eyes; roaring in ears; head and faceache; nausea and muscular weakness, so that he must lie down else he would fall. Night passed without sleep in this state; some slumber for two hours about 4 a.m. Next day he went about from morning till night half asleep. Memory and attention quite deranged; pupils dilated; pulse sometimes quicker, sometimes slower; after mental or bodily exertion confusion of head; headache and faceache; tongue furred in morning; taste flat; skin of whole body cold and dry; diuresis much increased. —SCHROFF, *Prager Vierteljahrsch.*, ii, 1854.

V.—Dr Gerstel took, 5th January, in morning fasting, 6 drops tinct. acon. in water without effect. 6th.—Eight drops. Soon giddy confusion of head in right side of forehead when walking in open air, bruised pain in nape on moving it, as if confined to certain muscles, especially in evening and at night, when lying down. The coryza previously fluent became dry. At night in sleep feeling of dryness in mouth and fauces, compelling him to drink on waking. Soon afterwards profuse but transient sweat all over the body, and continued unusual transpiration, and again in morning profuse transient sweat. 7th.—In morning 10 drops. Soon transient weariness of legs on commencing to walk. The pain in nape continues. 8th.—Morning, 16 drops. For an hour cooling burning in fauces, afterwards in tongue as from pepper or saltpetre. Pain in nape continues. 10th.—Noon, 20 drops. Immediately hot feeling in chest, and disagreeable feeling about heart. The taste of pepper in fauces came later. 11th.—At 10.30 p.m., 20 drops. Slept restlessly or woke often with pepper taste in mouth. 12th.—Morning, 27 drops. Some headache, pressive stupefying pain in frontal region, getting worse about 6 p.m. A pressing out in temple, with fulness in forehead and prickling and smarting in eyelids as in commencing catarrh; at same time flush of heat. Scraping in throat, and palpitation of heart. The pain in nape, which had ceased for three days, troubled him all day. 13th and 14th.—No symptoms. 15th.—Forty drops in a glass of water, with 100 drops alcohol, took in morning fasting a fourth part. Continued pepper taste on tongue, flow of water into mouth, hot feeling in, and over chest; pain in forehead and temples; eructation of air and nausea

from stomach, going off after breakfast; violent palpitation of heart with disagreeable feeling in cardiac region; tickling itching on inner side of left upper arm; burning and agreeable warm feeling along back of left index; cold spreading over inside of lower limbs from middle of thighs downwards, especially on knees and feet, then pressing pain in left temple, and pressure and digging in chin. After one hour bruised pain in middle of thighs, and unusual coldness of feet even in the room and when walking. About noon took the same dose. Immediately recurrence of the pain in left temple, first a pressing, then a slight soreness, at same time feeling as if the forehead and face, especially left side, swelled. This feeling of swelling gradually spread almost all over the body, especially its left side, and is accompanied by many painful sensations, as bruised pain of muscles, bruised feeling or pressure in bones, sometimes in one or other rib, sometimes in left arm. The left side of forehead, face, arms, and upper part of chest is longest affected; at same time crampy feeling at heart. Whilst the left cheek feels swollen and hot it is cool to the touch; formication in right cheek and right forearm. From the left side of face the sensation spreads to the ear, as if something lay before it, but the pain seems to be in the bone around the auricle. The painful feeling in thigh and arms passes gradually into a numb sensation. About 4 p.m. a constant chilliness or even coldness over whole body, especially in feet and knees; occasionally when swallowing aching in right Eustachian tube; soreness and itching in tarsal edges, and bruised pain in various parts of body. Pulse at 3.30 67, small, easily compressible, about 4 p.m. 74, beats stronger. About 5 p.m. pulse 102, full, and hard. Whilst the feeling of coolness is predominant in lower limbs an agreeable warmth spreads over rest of body, with transient anxiety and warm feeling about heart. Bursting out of sweat over forehead and præcordium. Later sweat broke out all over body, especially on head, nape, chest, and abdomen, while the feet remained always as if a cool wind blew on them. At same time a pressure on upper eyelids of both eyes alternately, and occasional sensation as if the whole eyeball were pressed into orbit, so that the eye pained as if contused. The heat of body, especially face with red cheeks, and the tiresome pains in forehead, temples, eyes and nape lasted all the evening, with very accelerated and strong heart's beats. About 6 p.m. moderate thirst. In evening good appetite, slept well, and in morning some sweat. 16th and 17th.—Took remainder of solution. On 16th showed only slight feeling or coldness, and on both days some uneasiness and pain in nape, eyes, and head. 23rd Feb.—40 drops of tincture in water at once. After one hour shooting and drawing pain in left upper and lower maxillæ, in right molars, in both tibiæ and arms, but especially in left side of nape; at same time feeling of swelling of left cheek, pressure in stomach, empty eructation, burning on tip of tongue with flow of water into mouth, all in rapid succession. More constant was a penetrating shooting at lower end of inner side of left forearm; heaviness and outpressure in right side of head with slight drawing burning pain in border of right lower alveoli. The very fine shooting or shooting burning pains as if in the skin, felt in various parts of body, were sometimes accom-

panied by a feeling of heaviness, numbness, or swelling. A continued disagreeable feeling about heart, as if a heavy body lay there; later it was pressive and burning with accompanying pressure and flush of heat over back. Heaviness and confusion of head with tiresome pressure on left eyeball. In forenoon while walking in open air in foggy, muggy weather, chilliness over both arms, especially left; continued pressing pain in left shoulder, apparently in conjuction with drawing and numb sensation in left occiput and posterior external aspect of left upper arm, followed by feeling of prostration of these parts, especially of the upper arm. About 11 a.m. when sitting still, agreeable warmth, especially from back over whole body, with moderate sweat. Continued weariness of legs, especially on going up stairs. When walking slight pains in upper abdomen and frequent fruitless calls to stool. Very frequent micturition; urine hot and high coloured. Sexual desire several times very excited. Went to bed at 2 a.m., was long of falling asleep, and sleep was not sound; vexatious quarrelsome dreams. 24th.—Had slept but little; in forenoon frequent attacks of colic, with distension of abdomen, relieved by discharge of flatus; at same time exhaustion, frequent slight chills over back and thighs, increased urine. Afternoon, during stool, cutting in bowels, which went through chest like sharp knife stabs, almost compelling him to cry out, at same time almost barrel-like distension of abdomen. After pappy stool relief, and after a disagreeable feeling of burning and shooting about heart felt quite well. That night quiet sleep. 27th.—Half an hour after breakfast forty drops in water at once. Immediately drawing in right side of nape; feeling of pressure on instep of right foot; as if something lay before right ear; pressure in fauces. In forenoon frequent fine stitches, aching and stoppage in left ear, as in catarrh. Some of the symptoms, as those of the ear, the throat pain, the flush of heat, the shooting drawing pains in left temple, &c., occur when entering the room, and go off when walking in the open air. At noon nauseous taste at root of tongue, that goes off while eating and comes back thereafter; empty eructation; some pressure in stomach and fauces, with slight burning and flow of saliva. Afternoon, great discharge of flatus, at night horrible dreams. Next day, 28th, several recurrences of the disgusting taste in mouth, and repeated sexual excitement. 29th.—Well. 1st March.—At 11 a.m., 50 drops of tincture in water. Only a few transient symptoms occurred: weariness of legs, pressure in left eyeball and right orbital region; burning in fauces, pressure in stomach; griping in upper part of abdomen with distension of abdomen; somewhat increased transpiration with general warmth. Afternoon uncommon feeling of comfort in whole body.—*Oest. Ztsch. f. Hom.*, l. c.

VI.—Mrs. Gerstel, aged 30, nervous constitution, sanguine temperament, always well except occasional periodic prosopalgia, nursing a baby 9 months old. 10th February, 10 a.m., took 3 drops of acon. tinct. in water. After one hour heat in palms and face, with redness of both cheeks and feeling of the face increased in size; frequent yawning; at noon, little appetite. After a short siesta in afternoon very pale face with icy coldness of hands. At 5 p.m. coldness over back

and legs. At 7 p.m. face and hands warm again; pulse 68; heaviness in forehead and parietal bones; noise is intolerable; coldness over limbs; a momentary drawing along thighs, with long-continued discomfort in knees, especially left, as after long stooping. All afternoon discomfort, as from deranged stomach; empty eructations; very little appetite even in the evening. 11th, at 10 a m., 3 drops. Sleep stupified, confused dreams; can hardly waken properly. 12th.—In morning head dazed; at noon some cold feeling in hands and feet; afternoon, heat in head, cheeks, and hands; variable temperature later; appetite good. In April, the baby being weaned and the menses haivng occurred, took 20 drops of the tinct. in water. No symptoms immediately. After several days there appeared on face, forehead, nape and other parts discrete itching vesicles, the size of a pin's head, coming out for a fortnight, repeatedly desiccating, scaling off, and then disappearing.—*Oest. Ztsch. f. Hom.*, l. c.

VII.—Heinrich took extr. alcoh. rad. acon. neom. Pulse at first quicker. After twenty minutes eructation, scraping in throat, confusion of head, pupils dilated, vision dim, head heavy, confused. After forty minutes formication at first on tongue and lips, then on face, spreading all over body. Along with formication, itching in skin, sometimes distortion of features; skin dry. Headache increased by bending body forwards, afterwards tinnitus aurium and vertigo; pulse slower (from 62 to 51 in two hours), and so small, weak, and intermitting it could scarcely be counted. Breathing oppressed, with feeling as if thorax were constricted, saliva increased. On walking great weariness, and on continuing to walk pain in elbows, knees, and hip-joints, this pain was relieved by pressure, but not quite removed. After four hours the headache and faceache became very violent, spreading all over the body; stool was passed; the formication increased; there was extreme restlessness, so that he walked about his room almost all night like a mad person. The skin became dry and cold, respiration oppressed but quicker, pulse very slow, 40. Very violent eructation, inclination to vomit, spasmodic constriction of stomach and contractions of abdominal muscles; no vomiting. On walking about vertigo, roaring in ears, great sensitiveness to light. When the formication went off the epidermis scaled off on face. Towards morning he lay down again on account of great exhaustion, and soon fell asleep; when he woke he was very warm and perspiring. Several times he experienced erections and pollutions without voluptuous dreams. Next morning he was quite well, but on standing was much exhausted and the pains in joints returned. Once on his lower extremities there rose small papules and vesicles filled with serous fluid, very painful. Memory weakened; sense of touch diminished, so that he could not distinguish small objects by the touch. He made three trials of 0·01 gramme of extr. of root of acon. neom.—SCHROFF, *Prager Vierteljahrsch.*, ii, 1854.

VIII.—D. C. Hencke took, 1st October, 1841, at 6 a.m. 4 drops tinct. acon. in a teaspoonful of water. Some pressure in stomach after one hour. 2nd October, 6 a.m., 8 drops tinct. acon. in 1 oz. water. Pressive pain in stomach (after one hour) lasting one hour.

Heaviness and fulness in chest when walking; he felt as though the chest could not be expanded, compelling him to breathe deeply often (forenoon). 3rd October, 6 a.m., 10 drops. Increased full feeling in chest when walking. Palpitation of heart felt when walking; flying stitches in the cardiac region, sometimes felt when at rest. Tiresome pressure on crown (forenoon). 4th October, 6 a.m., 24 drops. Tiresome pressive headache, first in crown, then in forehead, where it caused feeling of heaviness and fulness, lasting several hours, aggravated by movement (forenoon). Flying stitches in chest here and there; full feeling in chest; pressive pains on sternum, some palpitation of heart when walking and frequent deep breathing. Three liquid stools of fetid dissolved fæces during the day. Icy cold feet (evening). 5th October.—6 a.m., 30 drops. Headache, full feeling. Three watery stools with slight griping. The urine passed in morning brown, on standing turbid, and with dirty brown sediment. Feet and hands icy cold (evening). 6th October.—Many confused dreams during past night. The feeling of weight and fulness in chest more troublesome, compels him to breathe deeply even when at rest, accompanied by internal restlessness, anxiety and palpitation of heart. Pressive pain in region of heart. Three watery stools with rumbling in bowels and qualmishness. 7th October.—Dreamt much at night. Oppression of chest, internal restlessness, palpitation of heart, even when at rest, pressive pain in cardiac region as yesterday. Confusion of head, pressure in forehead, frequent heat in face, cold hands and feet, especially evening. Indisposed to mental exertion. Two liquid stools with qualmishness and rumbling in bowels. 8th.—Many dreams. Great confusion of head and pressive pain in forehead on waking. Frequent deep breathing while driving. The weight and full feeling on chest, internal uneasiness, palpitation, &c., went off on taking exercise in open air. Qualmish feeling in abdomen. Great feeling of hunger, renewed after eating. No stool. 9th and 10th.—Symptoms gradually went off.—HENCKE, *Arch. f. hom. Heilk.*, XX, 1, 181.

IX.—Dr. Maschauer on 28th and 29th February, one hour before breakfast, took each day 5 drops of tinct. acon; no symptoms. 1st, 2nd, and 3rd March, each day 10 drops; each day for six or seven hours continued confusion of head, shivering all over body; the 1st day only once, the other days he was so cold he could not get warm at the fire; nights restless. 4th.—Fasting, 15 drops; in half an hour, while sitting quietly, suddenly violent palpitation with tight feeling in chest; felt as if boiling water was poured into the chest, immediately afterwards icy coldness through him, he felt like to faint; this lasted five minutes. During the day frequently recurring shivering with violent headache in right temple; night sleepless. 5th.—Very weak and prostrated, but took in the morning 15 drops; after two hours palpitation of heart lasting all day, worse when walking, better when at rest. At 5 p.m. headache, increasing till 8 p.m. to a violent pressure in both parietal regions, disturbing sleep, and lasting all the 6th; continued shivering; felt very weak and ill; evening and night somewhat better. 7th.—15 drops; all day increased thirst, prostration, heat, and chillness; in evening pressive headache in vertex, pulse full, 80 to 90; night restless, broken

by frightful dreams. 8th and 9th no medicine; headache continued; slight stitches dart through chest; a disagreeable scraping in throat excites dry cough; cold and heat alternately all day; prostration, frequent waking at night. 10th and 11th.—Each day 20 drops; dry short cough both days; dry heat throughout the body. 10th, at night, much thirst, restless, chilliness, and heat till morning; bitter taste all day in mouth and scraping in throat; the cough and great weakness troubled him 13th and 14th. 14th.—Morning and evening 10 drops; all day dry heat and weakness, in evening rigor and headache lasting till midnight, quiet sleep, cough abated. 15th and 16th.—Each day in the morning, fasting, 20 drops; both days bitter taste with burning in mouth, oppression of chest as if a great weight lay on it; first night restless; next day great weakness and chilliness; in evening pain in vertex till midnight, then quiet sleep. 17th.—Morning and evening 15 drops; during day only weak, but in evening oppression of chest, dyspnœa, dry short cough, much thirst with chilliness; at night pressive pain in vertex, very restless; next day very weak, head confused. Cough went off on 18th. 12th April.—One hour after breakfast 40 drops; and 13th 50 drops. The first day pepper taste; afternoon, paralytic drawing in legs, heaviness of head and drowsiness; next day eructation of air, feeling as if the stomach were alternately distended and fallen in, the rise and fall could be distinctly felt with the hand; very anxious; the heart's beats could be distinctly felt, and were in quick succession, pulse slow, almost intermittent; this lasted three minutes, then he must quickly sit down as he was unable to stand longer; all day great exhaustion, in evening headache in vertex lasting till midnight. 14th.—50 drops; less exhausted in open air, constant drowsiness in the room, he might read, write, talk, no matter, there came on irresistible sleep from which he could not rouse himself without great effort; thoughts distracted; the time since yesterday seemed to be very far distant, and he must think for some seconds bsfore he could remember what he had done; after a meal sudden vertigo, so that he must support himself and sit down; night restless; all next day exhaustion, in evening for two hours great confusion of head. 16th.—Morning, 60 drops; all day long headache and painful stitches in left upper half of thorax, especially on inspiration, dyspnœa, feeling as if a catarrh were commencing, frequent sneezing with stitches in chest, irresistible drowsiness, even when walking, at night anxious dreams, on waking great exhaustion. 17th.—60 drops; catarrhal feeling as yesterday, dyspnœa, ameliorated by coughing; frequent stitches in left side of chest, much sleep by day and night, distraction, headache in crown occasionally, increased in evening, relieved for a short time by cold washing of face and head. Throughout next day constant disagreeable restlessness, wanted sometimes to sit, sometimes to stand, sometimes walk, does not know what ails him; thoughts distracted, what he wishes to do one moment he forgets the next; night sleep restless. 19th.—Morning, 40 drops, after one hour again 40 drops; taste of pepper in mouth, especially on tip of tongue, then plainly felt palpitation of heart, heat throughout body, feeling of anxiety, relief after drinking water; anxiety soon returns, feels as if some great misfortune would befall him; vertigo, even to make him fall; cough with

stitches in chest, pulse full, quick; afternoon better, but very weak; evening headache; night quiet. 20th.—80 drops taken in two doses; burning on tongue, empty eructations all day, distension of stomach which is sensitive to touch; headache in crown, as from pressure of a heavy weight, only going off in the evening of next day; after eating sudden vertigo, must catch hold of something to support himself; periodical stitches through chest, accompanied by dry, short cough; exhausted feeling; at night constant restlessness, alternate cold and heat. Next day, besides the headache catarrhal feeling and oppression of chest, with some cough and exhaustion. In the night between 22nd and 23rd slept well, and had no further symptoms.—*Oest. Zeitsch. f. Hom.*, l. c.

X.—N., married man, choleric temperament, in good health. 1st day.—2 drops tinct. acon. At 7.30 p.m. 8 drops. Soon afterwards drowsiness when driving, eyes closed for some seconds. After three-quarters of an hour, several times in a few minutes, violent spasmodic yawning, repeated at 10 p.m., fell fast asleep in his chair till 1 a.m. 2nd day.—At 6 a.m. hurried call to stool, with copious soft evacuation with straining; no other symptoms. Some days later 2 drops. 1st day.—At 2 p.m. 8 drops, at 6 p.m. 5 drops, at 7.30 p.m. 20 drops. Soon afterwards violent yawning without drowsiness; great laziness and faint qualmishness, no actual nausea. Painful rumbling in bowels and discharge of flatus, with relief. After one hour urging to stool, copious evacuation, followed by some straining. 2nd day.—Dry, short cough, several soft stools, with hurried urging. Some days later 8 drops of a solution of 5 drops tinct. acon. in 30 drops water. Of this 8 drops morning, noon, and evening. Nothing observed but slight emotional disturbance, flushes of heat, especially in face and ears, slight pressive pain in head in right frontal protuberance, spreading to upper orbital border, soon going off.—HENCKE, *Arch. f. hom. Heilk.*, loc. cit.

XI. N. N., medical student, aged 23, sanguine temperament, delicate constitution, troubled during past year with palpitation of heart, for which acon. gave him speedy relief, since then in good health. From 14th February to 3rd March inclusive took daily, morning and evening, from 14th to 16th 10, on 17th 15, thence till 22nd 12, from 22nd to 27th 15, from 28th till 3rd March 20 drops, and on morning of 4th 20 drops. No symptoms except scraping in fauces, pepper-like smarting on lips, gradual injection of palate and tonsils; and 4th March tearing all through forearm, wrist, and fingers of right side. 5th.—Morning 24 drops. Tearing in upper arm and upper third of right thigh. From 6th to 13th daily, morning and evening, on 14th and 15th only morning, 24 drops. On 6th scraping in throat, which is injected; evening, tearing in right upper arm about elbow-joint and in thigh about knee-joint; on 7th, afternoon, a sudden tearing in left knee-joint lasting ten minutes. On 8th and 9th occasional violent tearing alternately in both thighs, in right knee-joint, and right forearm. Along with scraping in throat on 9th the uvula and right tonsil were much injected. 18th.—On coming into open air one hour after taking medicine violent palpitation of heart, that after dinner at 3 p.m. and 8 p.m., one hour after the dose, returned and lasted quarter of an

hour. Next day two attacks of palpitation of heart, pulse quicker and stronger. Sleep during the whole time sound and dreamless as usual. 12th, afternoon.—Violent tearing in right arm about elbow-joint. Both tonsils and uvula very red, scraping in throat. 13th, forenoon.—Palpitation of heart that lasted half an hour, with feeling of tightness of chest. Between 5 and 6 p.m. tearing in left shoulder-joint. Next day at 10 a.m. palpitation of heart, hard stool after three days of constipation. 15th.—Only scraping in throat. 17th, 5 p.m.—24 drops. After two hours violent and quick beating of heart for half an hour. 18th and 19th, morning.—20 drops. The first day, in afternoon, tearing in whole left forearm. Second evening violent palpitation of heart. 20th, forenoon.—Palpitation worse than ever with great anxiety and difficulty of breathing. Took at noon 20 drops, when it became less, but lasted slightly all day and evening; in addition tearing and prickling like ants crawling in right arm. The next three days morning 24 drops. No effect. Therefore, from 23rd to 26th he took daily, in the morning, 40 drops; from 27th to 8th April daily 50 drops. 23rd.—Tearing in elbow. The next two days no symptoms except some scraping in throat. 26th.—In evening violent tearing for half an hour. 27th.—After half an hour formication along left arm. 28th.—From 11 a.m. till 1 p.m. very violent palpitation of heart; transient coldness with momentary shivering, followed by heat and sweat. 29th.—Besides tearing in elbow for ten minutes a sudden, transient, but violent compressive pain in right upper orbital border. 30th.—No symptoms. 31st.—Same symptoms as 29th, but only late in the evening; also pressure on the left eyeball as from a heavy weight. Tearing in orbital border; this ceased the following evening. 2nd April.—On going out violent palpitation of heart. 3rd, forenoon.—Pressive tearing pain in left orbit, like constriction, as if the eyeball would be pressed out. This was repeated 5th and 6th. 7th, morning.—Half an hour after the dose violent palpitation of heart lasting half an hour, with great anxiety and dyspnœa, also the pain in right orbit. After a walk of an hour marked exhaustion of extremities, increased on again walking in afternoon. When at rest rigor, lasting from five to ten minutes, followed by considerable but transient heat and rather profuse perspiration; at same time heaviness of head and a vertiginous swaying and swinging of head. 9th.—At 6.30 a.m. 70 drops. After quarter of an hour palpitation of heart and great oppression, feeling of pressure in right orbit, and heaviness of head; he feels as if tipsy, and quite unable to study. 10th, 7.30 a.m.—50 drops. Soon afterwards palpitation of the heart with great oppression; all day heaviness of head, giddiness; roaring in head and ears, increased by reading; he staggers as if tipsy or as if he had had a violent contusion on head. 11th, morning.—50 drops. Tearing in right forearm worse than ever, lasting from 11.30 a.m. till 5 p.m., at same time continued giddiness. At 8.30 p.m. 50 drops. The tearing repeated till midnight. 12th.—100 drops; no symptoms. 13th.—At 6.30 a.m. 120 drops. From 10.45 a.m. till 4.30 p.m. constant feeling of tearing in all left forearm, hand, and fingers. This symptom reappeared the next day at the same time and with equal intensity, but was limited to forearm, and lasted

only till 3 p.m. At same time quickened heart's beats and difficult breathing. The following day no symptoms. 16th.—Only the cardiac and respiratory symptoms appeared. 17th, forenoon.—From 10 a.m. onwards pressive pain over whole cranial vault, as if equally compressed from all sides, the pain is sometimes concentrated with the greatest intensity in left orbit. This lasted till 1 p.m., came on next day at same hour with still greater violence, declined about noon, and went off completely during dinner at 1 p.m., but returned with equal violence about 3 p.m. In forenoon it was accompanied by tearing in forearm, great anxiety, and dyspnœa. 19th, 20th, and 21st.—No symptoms. After irregular intervals of three, four, and five days there occurred occasionally during the day some tearing in various parts, chiefly in left forearm, gradually growing slighter. The palpitation occurred occasionally, and at length went off completely. Even after a month the tearing was occasionally felt.—*Oest. Zeitsch.*, l.c.

XII.—Dr. Reisinger took from 5th till 15th January, daily 5 drops half hour before breakfast. On second day slight formication with warm feeling in left index and middle finger; at same time painful drawing in right cervical and nape muscles, which went off during night. 10th.—Slight transient shiver over back; shooting and tension in gastric region for several hours, very like flatulent colic after a full meal. 18th.—Ten drops, three times, half hour after breakfast, at noon, and at 4.30 p.m. Woke from afternoon siesta (which always made him warm) with chilly feeling all over body and cold right upper arm, the left being moderately warm. The chill lasted while walking in open air and in warm room till 7 p.m., when it gave place to transient disagreeable warmth, as in catarrhal fever. From 19th till 27th daily, morning and afternoon, 10 drops. No symptoms except empty eructation after each dose, and twice slight pressing headache in right temporal region. 28th, 29th, and 31st.—Morning, 20 drops. 28th.—All day, increased feeling of warmth, exhaustion of head, small appetite; even before going to bed, increased warmth, full quick pulse. When sitting still felt beating of carotid and temporal arteries. No desire to go to bed; when he went to bed at 1 a.m. felt need to sleep but could not sleep; increased disagreeable heat of whole body, especially of lower extremities; sweat on inner surface of thighs, over scrotum, and violent itching there compelling him to scratch till blood came, somewhat allayed by cold washing. In the half-sleep that lasted till morning, troubled with confused fantastic dreams. 29th.—Forenoon, sweating and itching on scrotum; in evening and through night troublesome heat, night sleepless, with dreams; the following night less, but still very restless. 31st.—Momentary pain in right hip, that went off when walking in open air. From 1st till 4th February, daily 40 drops, half hour after breakfast. 4th.—Transient slight pressing pain in right temporal region, a similar transient pain in right abdominal parietes, as from flatulence, two or three times during day. This latter came on the next three days in left side. 7th.—Evening, chilliness followed by slight warm feeling, ending at night in profuse sweat. 8th, 9th, and 10th.—Daily, 40 drops, return of the periodical pains in abdomen. 11th.—Sixty drops. All day very depressed spirits. Evening, for five

or six hours' pain in cervical muscles and shoulder-joint, so that he could not move arm backwards without great pain. Sound sleep at night. 12th, 13th, 14th.—No medicine. 14th.—Noon, slight griping in belly; night, sudden slight prickling in tips of fingers and toes, frequently recurring. 15th.—Sixty drops. Only astringent taste and hawking of fluid saliva. 18th March.—Sixty drops. After one hour violent pain in left eyebrow, as if the head were split with a wedge, lasting more or less all forenoon; frequent eructation, with taste of medicine; prickling and burning in tongue, as from pepper or much tobacco smoking. These symptoms felt equally when walking in open air, and in the room. Woke from afternoon siesta with slight transient shooting in left upper part of chest, as from flatulence; evening, confusion of head, difficulty of getting to sleep; quiet night. 19th.—Eighty drops in water. After half hour feeling of burning and heat in lung, not affecting breath, felt as if a hot fluid would rise into mouth, at same time constant burning and visible swelling of tongue, as after pepper or peppermint, with feeling as if cold air passed over it; frequent increased secretion of watery saliva, almost like salivation, lasting four hours. At same time the wedge-like forcing asunder headache worse in room than in open air. Very anxious and giddy; slight chilliness over back, with numb feeling on sacrum to lower extremities; when sitting or standing the lower limbs feel as if asleep, or as if adherent to the ground, this went off immediately on walking, but recurred at once on sitting down or standing still, lasted half an hour. Frequent emission of urine as clear as water, though he had drunk nothing but the medicine. At noon felt well, evening slightly increased cutaneous temperature; night tolerably quiet; next day no symptoms except those of the mouth. 21st.—All the symptoms of the 19th returned in the same order only slighter and shorter. 22nd.—100 drops in water. After one hour burning pain in tongue increasing every minute, with considerable flow of saliva, for four hours; anxious feeling in scrobiculus cordis, with vertigo, especially in warm room; constant chilliness in back with cold extremities, even in warm room, as before a catarrhal fever breaks out, for one hour; depression, out of humour, very hard stool, sore feeling in anus. Next two days, no medicine, no symptoms. 25th.—120 drops in water. For half hour a hot burning from stomach up through œsophagus; the head, tongue and saliva symptoms, as also the chilliness over back and lower limbs as before, feet as heavy as lead when sitting and standing; toes of right foot went to sleep when walking; anxious trembling, like vertigo, boiling and simmering through body as if hands and feet would go to sleep, or as when one is on the point of becoming intoxicated with wine, always accompanied by a disagreeable cold feeling. The two next days prostration, confusion of head, in evening, greatly increased temperature of body, with swollen cutaneous veins. 28th—140 drops in water. Vertigo for four hours, burning of tongue. Salivation, burning in stomach and along œsophagus. Vertigo and stupefaction, general anxiety as if the blood would come out of all the vessels, accompanied by constant chilliness and cold face even in warm room, better in the air, and when moving; stumbling of legs, and feet as heavy as lead, so that he could scarcely walk. Longs

to be better, is cross, everything is disagreeable to him. Evening momentary shooting and drawing in sacrum, frequently recurring next day, especially when at rest. 30th.—140 drops. No symptom except slight burning of tongue, confusion of head, dryness of fauces, with slight increase of saliva. 1st April.—200 drops. The usual symptoms of tongue and saliva somewhat less than on previous days; heaviness and weariness of limbs, slight chilliness over back, cold feeling of face which is hot to the touch; quiet sleep at night. The next three days, in which he took no medicine, daily headache in afternoon, and rather restless nights. 5th,—160 drops in water. After half hour disgusting sweet taste in fauces, sometimes causing hawking of viscid mucus, sometimes swallowing of it; sensation as if viscid mucus were hanging from uvula, causing inclination to vomit for one hour; then the usual pepper taste, that spread from the root of the tongue gradually all over the tongue; at same time increased flow of saliva, when the sweet taste went off; dryness of fauces with irritation to cough that can be suppressed. A kind of numb sensation spread from teeth over cheek-bones to external canthus of eye, and then over almost all the body. The brain seemed to be too large and pressed forcibly on the skull; at same time chilliness over back with predominant coldness and paleness of face. All this lasted four to five hours, even during a warm bath. The numb feeling of the extremities when at rest went off by walking. Excessive weakness of limbs; staggering of knees; general laziness so that he must drive to his business; frequent ill-smelling eructations with taste of medicine, which always relieved a tensive feeling in pit of stomach; vertigo as from slight intoxication, with great distraction of thoughts, so that when when seeing patients he often became anxious; aggravation in room or when at rest, amelioration in open air and when moving. The next two days transient slight drawing shooting pains in left chest, left ear, and later left knee-joint. 8th.—108 drops. After one hour the usual phenomena in mouth, fauces, œsophagus, stomach, teeth and face. The wedge-like bursting pain in temporal region slighter, and more of a dull stupefying sensation, making thinking almost impossible, and causing a peculiar anxious feeling. During internal chilliness from back over lower limbs, whilst upper limbs are warm, cold sweat occurs; the face is icy cold to the touch. The numb feeling of lower limbs, especially of feet and toes, stronger than ever, and even while walking, so that he must often stand still, in order to get rid of this feeling by moving feet backwards and forwards. All this lasted four hours. Appetite, throat and other functions unaffected. In evening, when at rest in unheated room, sensibly increased warmth, quicker pulse, manifest catarrhal symptoms; legs as heavy as lead, especially on going up stairs; staggering, general laziness.—*Oest. Zeitsch.*, l. c.

XIII.—Dr. Rothansl took 4th February, 7 a.m., half hour before breakfast, six drops of tinct. acon., increased daily by 1 drop so that by 13th he took 15 drops. From 5th to 12th the symptoms were: Every night excessive restlessness, generally slept some hours before midnight, and then restlessly and disturbed by heavy dreams; the remainder of the night sleepless, but continual very vivid fantasies prevented full consciousness. Great dryness of the body and burning itching, especi-

ally on inner sides of thighs and round the knees, that did not permit a moment's rest. 5th.—Vertigo on stooping, vision of sparks, mist before eyes. 6th.—Roughness in throat (soon after the dose) frequent secretion of mucus from larynx; afternoon, drawing and paralytic stiffness in right upper arm, for one hour. 8th.—Heaviness of head, giddiness, tinnitus aurium, especially when yawning, which occurred frequently. 9th.—Forenoon, for two hours, irritation to cough in larynx, cough dry. 11th.—Vertigo and tinnitus aurium. 13th.—After midnight wakened by violent rigor, it came in fits every five minutes, went from præcordial region and was lost in exremities. Slept after each attack of rigor, and was disagreeably awoke by each new attack. This lasted two hours, then burning dry heat, pulse febrile (heard it in head). On awaking in morning was bathed in sweat. 14th and 15th.—Unusual weariness. 16th.—Violent stitches in region of eighth, ninth, and tenth ribs, at first left then right; oppression of chest. In evening a very severe burning stitch in left half of chest. 17th.—The shooting pains lasted all day in slighter degree, and sometimes extended to loins. 18th.—Tension in left patella, transient stitches in right half of chest. 19th.—At 12.45, rigor, lasting one hour as on 13th, then excessively profuse sweat that completely soaked the bedclothes, till morning; sleeplessness; in morning fluent coryza; all day great exhaustion; tension first in left than in right patella, that rendered going down stairs difficult. Evening, tensive pain only in right patella, which lasted till 22nd. 20th.—Rigor in the night, thereafter dry hot skin and sweat, but not so profuse as yesterday, great prostration during day; coryza continued. 21st and 22nd.—Restless sleep; dry cough, especially violent in warm room; heaviness on chest; bruised pain between shoulders; excessive weariness. 23rd.—Dull pain in temples; hoarseness; dry cough; dry feeling in windpipe (afternoon) twice he expectorated thin white mucus mixed with streaks of bright-red blood; bruised pain betwixt shoulders, 24th.—Coryza continues; cough with scanty frothy mucous expectoration; tension in right patella. 27th.—Violent headache, especially in right half of forehead; coryza continues; cough violent, with peculiar dull tone, very fatiguing to chest, rather dry, rare expectoration of thin white mucus; evening, chilliness in warm room; constant irritation to cough. 28th.—Night very restless. The frequent cough caused aching and burning pains in the course of the windpipe down to scrobiculus cordis. In morning often hoarse, and so much plagued by the harassing dry cough, especially in warmth, that felt he must lie down. About 11 a.m., shooting pain in right upper orbital border, that spread in dendritic form thence upwards over forehead to hairy scalp, sideways to right temple, and down to cheek and two or three molars, increased by pressure, and beeame so violent towards evening, when the cough became constant, that all other symptoms appeared insignificant, and it could hardly be borne. Complexion very red, face hot, eyes sparkling. Next night pretty good. 1st March.—The supraorbital region was somewhat swollen in the morning; a dull shooting pain was felt on strong pressure. Dry cough returned frequently. Felt very much exhausted, and could not occupy himself with reading. 2nd.—The pain over right eye only felt on

pressure; cough violent. Every breath of fresh air did him good. At night the peculiar rigor that had not occurred since 20th February, came on, also the tension in right patella that had troubled him at first, became very bad on 3rd March. After this the symptoms gradually went off.—*Oest. Zeitsch.*, l. c.

XIV.—J. Schneller proved extr. acon. alcoh. aquos. Phar. Bor. From 4½ grains, only griping and increased warmth in abdomen. From 5 to 9½ grains, first pressive pain in forehead and occiput, then increased heat of whole body, some palpitation of heart and full pulse that did not allow him to remain long at one occupation. After 7½ grains, scraping and burning in œsophagus, anorexia, and yellow fur on tongue. After 9 grains, the conjunctiva of both eyes much injected, especially in internal canthus. The last four strong doses caused severe abdominal symptoms, headache and dryness of fauces, slight stitches in lateral parts of chest, there especially in cardiac region and left hypochondrium. After 24½ grains, a very violent drawing pain, increased by pressure in dorsal and lumbar region, along the sacrolumbalis and longisismus dorsi on both sides of spine, so that every movement of the trunk was difficult; this went off in five hours, and the same pain came in recti abdominis muscles, which were stretched as hard as a board. After eight hours only tension of abdomen. Three days later took 26½ grains, this caused wandering stitches in left hypochondrium, back, and head, tension in lumbar region lasting three days, increased heat and redness of face. Great distraction, weakened memory with exalted mental tension; spirits cheerful, sleep quiet.—*Wiener Zeitsch.*, 11th March, 1846.

XV.—Schneller and Flechner proved extr. acon. herb. recent. Commenced with ½ grain, and took as much more every day, the largest dose 26½ grains. After ½ to 5 grains, frequent eructations, diminished appetite, scanty stool; later dull pain in head, especially in frontal region, lasting some hours. After 5½ to 10 grains, pressure in gastric region, distension of abdomen, slight griping round navel, loathing, white furred tongue, diminished appetite, dryness and scraping feeling in œsophagus, heaviness of head, especially in frontal region, prostration of limbs, increased heat of body, mental restlessness and disturbed sleep, quickened pulse and palpitation of heart. After 20 to 26 grains, pain in abdomen, great loathing, great development of flatulence and rumbling in bowels, the frontal pain increased and lasting longer, sleep restless disturbed by dreams, transient stitches in cardiac region. In one prover there occurred swelling of tonsils and scanty stools only.—*Wiener Zeitsch.*, iv, May, 1847, p. 106.

XVI.—Dr. F. Schwarz, aged 29, sanguine temperament, commenced 3rd January with 3 drops tinct. acon., increased the dose daily by 1 drop till 8th, then till 14th by two drops, on which day he took 16 drops. On 18th began with 25 drops, increased the dose daily by 3 to 4 drops, so that on 22nd he took 40 drops and on 24th 24 drops. When taking 20 drops felt warmth in mouth, relieved by drawing in air, as from taking peppermint. This went off after one hour. After 30 drops, slight burning from lips to fauces; mucous membrane of mouth slightly injected; roughness in throat, especially in posterior nares, compelling frequent hawking, with feeling as if viscid mucus was drawn

through choana, and a tiresome dryness increased by smoking tobacco. Painful spots on hairy scalp, sensitive to touch and cold air, and especially strong wind, like rheumatism. All went off in three hours. 6th February.—20 drops, from 9th till 12th increased dose daily by 10 drops; left off till 22nd, when took 50 drops, 24th 70 drops, and 26th 130 drops. The above symptoms occurred in same manner; after 50 drops, in greater intensity and lasting longer, especially burning in buccal cavity as from pepper, which after 70 drops lasted till next morning. During all the time excessively increased sexual desire. 8th March, 8 a.m., 100 drops. Violent scraping and burning in throat, as from cayenne pepper. After one hour, coldness over back and extremities, with increased coldness as if under skin, and slight rigors in short fits till 5 p.m.; at same time flying stitches in back of hand and dorsum of foot, and between scapulæ; in evening feeling of weight under sternum, preventing deep breathing, like a peculiar painful but transient pressure from sternum to spine; occasional flying stitches in the left pectoralis major and intercostal muscles, also under scalp. 9th.—140 drops, same symptoms. 12th, 10 p.m., 260 drops. Besides above symptoms extraordinary restlessness, constant tossing about in bed and sleeplessness till 3 a.m.; alternate heat and cold, in places goose-skin, which went off when sweat appeared. At same time constant eructations of air, with taste of alcohol; very violent heart-burn; frequent yawning and stretching of limbs; pressure especially on right side of chest; quickened respiration; pulse full, strong, and quick. When the sweat became general, the symptoms declined. Next morning felt quite well, except for a pretty severe shooting in fossa navicularis, which was always most marked when urinating. After eight days this symptom at length disappeared. 24th.—400 drops. Immediately violent burning from mouth to stomach, with taste of alcohol. This declined gradually, but together with eructation that appeared later, lasted all day. After 1 hour the constant burning in tongue as after excessive use of pepper, was particularly observable, increased in intensity for four hours, and together with the other symptoms gradually declined till evening. The soft palate, tonsils, and posterior surface of fauces were slightly reddened, with feeling of warmth extending from lips, which quickly became dry, to deep into œsophagus. Drawing in air caused agreeable coolness. Slight shivering over lower, then over upper extremities, with goose-skin in these parts, which became more general and stronger as the cold extended. The shivering is felt especially between skin and muscles, increases in intensity, so that rigor comes on whenever he keeps quiet. On moving briskly, walking quickly in open air, all the symptoms decline, but return immediately with double strength when standing or lying; at same time extraordinary prostration, indifference, distaste to all sorts of work, crossness and sensitive irritability. Appetite gone; eating does not relieve the troublesome eructation of hot air with taste of alcohol; but soup or meat causes loathing. In afternoon these symptoms attained their height; the rigor was so severe that he must lie down; icy coldness comes on; he is chilly under two blankets. At same time throbbing in temporal arteries, and feeling as if hair stood on

end. These spots were sensitive to touch. Slight burning in eyes, twitching and vision of sparks; occasionally roaring in ears, with sensitiveness to every noise. Breath hot, respiration quick, at each deep breath oppression, anxiety and painful stitches betwixt the scapulæ, on one side or other of chest, mostly right, but most severe from scapulæ to spine; pulse strong, full, slightly quickened (85, usually 70). With increase of cold very frequent yawning and stretching of limbs every minute, during the latter symptom the limbs, during former the breathing seemed too short. Towards 5 p.m. the coldness gives place to warmth, occasionally interrupted by slight shivering. During the increase of heat, which ends with slight sweat, the sexual desire was much increased. He could only get rid of erections by getting out of bed. All symptoms declined about 7 p.m., except violent shooting in glans penis when urinating, with emission of hot dark urine, this only disappeared on the 3rd day.—*Oest. Zeitsch.*, l. c.

XVII.—Siegel chewed some of the root of acon. at 4 p.m. Soon burning and tingling in tongue and palate. At 6 p.m., horripilation all over body, and vertigo; at supper felt inclination to vomit. Then horripilation frequent, præcordial anxiety, vertigo, prostration, urging to stool and urine like tenesmus. Took an emetic of ipec., vomited contents of stomach, confusion of head, slight distortions of limbs and eyes, lipothymia; skin dry first night, sleeplessness; next day præcordial anxiety, distension of abdomen and prostration.—*Nov. act. phys. med.*, t. vi, p. 129.

XVIII.—A young man took from 10th to 16th April ext. acon., beginning with $\frac{1}{4}$ a grain and increasing to $3\frac{1}{4}$ grains, in all 13 grains. The urine passed by day and night was analysed, and it was found that while taking the acon. its watery constituent was not increased, but its salts were considerably diminished.—De Soist, *Diss. de Aconito*, Berol., 1854.

XIX.—Dr. J. Sterz, aged 27, sanguine temperament. 1st February, 10 a.m., 3 drops tinct. acon. Afternoon, contused pain in right testicle; evening, weakness of knees; night, many dreams. 3rd, 5 drops; evening, weakness in knees; night, light sleep with continual dreams. 4th, 7 drops; evening, weakness of knees; night, sleep disturbed by many dreams; after midnight, burning about navel, lasting one hour; abdomen tense and distended; great discharge of flatus. 5th, 10 drops; eruption of red pimples on flexor side of thumb, index and middle finger, painful when pressed; evening, weakness of knees; night, many dreams, oppression of chest, compelling him to make frequent inspirations. 6th, 15 drops; afternoon, abdomen distended with flatulence and tense; great discharge of flatus; evening, weakness of knees, with frequent stitches in left knee, frequent yawning, scraping in throat, feeling as if something were sticking in fauces, causing frequent swallowing; confusion in forehead; jerking pain in nape, with feeling of stiffness; aching pain in sacrum; very perceptible heart's beats when sitting still and lying; night, many dreams, with oppression of chest and frequent deep inspiration. 7th, 20 drops; after one hour redness and heat of face, lasting half an hour; coryza with flow of thin mucus; feeling as if larynx were

compressed from both sides. The evening weakness of knees extends over right thigh and leg; contused pain in right testicle; tightness and pressive feeling on chest, especially in right thoracic cavity posteriorly and inferiorly (in lower lobe of lung); frequent deep breathing; bruised pain in right elbow-joint; abdomen tense, and distended by flatulence; heart's beats distinctly felt when sitting still; chilliness between 7 and 8 p.m.; at night many dreams and oppression of chest. 8th, no medicine; forenoon, contused pain of left testicle; afternoon, flatulent sufferings; between 6 and 7 p.m. chilliness; night, tightness of chest, with many dreams; pimples on fingers unaltered. 9th, night troubled with frightful dreams that remain long in the memory. The pimples went off on 10th. 16th, at 10 a.m., 10 drops; afternoon, troubled with flatulence; dull shooting pain in navicular depression of urethra, lasting three hours; night, many dreams. 17th, 15 drops; afternoon, weakness in right knee and left elbow-joint; single stitches in abdomen and cardiac region; evening, contused pain in right testicle; night, many dreams and oppression of chest, with frequent deep breathing. 18th, no medicine; forenoon, hard stool and pressive pain in sacrum, increased by stooping; oppression of chest; afternoon, troubled with flatulence, pain in right heel, especially on treading; night, many dreams. 19th, 20 drops; after one hour scraping in throat, with slightly reddened soft palate; burning on tip of tongue for one hour; afternooh, flatulence; sensation as if throat were constricted; prostration, chiefly felt in knees; contused pain in right testicle; oppression of chest and frequent deep breathing; warm feeling in abdomen. Between 8 and 9 p.m. slight chilliness; night, pressure in chest and many dreams. 20th, no medicine; roughness of throat that spreads down trachea and excites to frequent coughing; pressure in pit of stomach; a painful furuncle forms on tip of nose; slight oppression of chest; sleep disturbed by many dreams. 21st, no special symptoms; dreams much at night. The nasal furuncle disappeared on 23rd. 2nd March, at 10 a.m., 40 drops; after one hour burning on tip of tongue and roughness in fauces with red soft palate; noon, frequent yawning and drowsiness; afternoon, flatulence; dry feeling and scraping in fauces, compelling frequent hawking, with expectoration of tenacious saliva; stiffness of nape; stitches in right temporal muscle; feeling in root of tongue as if it were spasmodically drawn down at both sides; single stitches in legs and arms; aching pain in sacrum; evening, weakness of knees and right shoulder-joint; drowsiness and frequent yawning; contused pain in left testicle; on lying down chilliness; soon falls asleep. At midnight general perspiration; many dreams. Next day on morning prostration as after a fever; slight headache in left side of crown, aggravated by stooping and moving head, lasting till 9 a.m. 3rd, 60 drops at 10 a.m. After half an hour burning and scraping in soft palate that gradually spread to the hard palate and tip of the tongue and lasted two hours; soft palate somewhat reddened; pain in right calf as after severe cramp all forenoon; contused pain of left testicle; afternoon, burning on lips, with feeling that they were swollen; sensitiveness of scalp, especially on crown; on touching hair a peculiar painful tickling; evening,

abdomen distended by flatulence; voluptuous itching on glans penis; night, when falling asleep twice starting in affright; sleep pretty good in spite of many dreams; towards morning a seminal emission without voluptuous sensation. 4th, 5th, 6th, no medicine. 4th, after a meal violent pricks in bowels and liver, as with needles, for ten minutes; sleep disturbed by dreams; towards morning an emission with voluptuous feeling. 7th, 80 drops in two doses, first haif at 10 a.m., second at 4 p.m.; after one hour scraping in throat; towards noon oppression of chest with frequent deep breathing; afternoon, pressure in pit of stomach and renal regions; pain in calf as after cramp. 5.30 p.m., several times stitches in both sides of chest, sometimes deep, sometimes superficial, especially in cardiac region, not aggravated by deep breathing; confusion in right side of forehead; painful feeling in both calves; frequent yawning; feeling of constriction of pharynx; prostration. 10.30 p.m., peculiar painful feeling in anus, a burning and scraping lasting ten minutes; starting when falling asleep; night, inward heat; many dreams; oppression of chest with frequent sighing; pulse normal; urine darker coloured and scanty. During next day frequent deep breathing on account of heaviness and tightness of chest; evening, burning under sternum for ten minutes; slept well with dreams. After this quite well with exception of dreamful nights. 31st March, 10.30 a.m., 100 drops of 1st dilution; afternoon, feeling of pressure in pit of stomach and right lumbar region; evening, frequent yawning and hot feeling in upper part of body, especially in face, as if sweat were about to break out, which it did not; frontal region confused; night, sleep disturbed by dreams; towards morning an emission without voluptuous feeling. 1st April, 10.30 a.m., 100 drops of 2nd dilution, taking after this daily one dilution higher, so that on 5th he took 100 drops of 6th dilution. No marked symptoms except dreams at night. 12th, 13th, 14th, 11 a.m., 100 drops of 1st dilution. 12th, after two hours, roaring in left ear, recurring four times in afternoon, lasting less than one minute. 13th, many dreams, towards morning an emission without voluptuous feeling. After rising, face hot and red; this went off in open air. 14th, afternoon, frequent deep breathing on account of feeling of pressure under sternum; night, many dreams, towards morning an emission with voluptuous feeling. 15th, no symptoms. For several nights vivid dreams of a more agreeable character.—*Oest. Zeitsch.*, l. c.

XX.—Stoerck took on his tongue a little of the powdered stalks and leaves of acon. He felt a long-continued burning on the tongue, and momentary stitches through the tongue, with flow of saliva. On another occasion he took some extract of acon. on his tongue, which caused slight prickling on the tongue. One third of a grain of this extract swallowed caused general transpiration and actual sweat on the extremities and whole body.—Stoerck, *Libellus de Stram.*, *Hyos.*, *Acon.*, &c., Vienna, 1662, p. 69.

XXI.—W., aged 19, phthisical habitus, sanguine temperament. Took 2nd October, 4 drops; 3rd, 8 drops; 4th, 10 drops; 5th, 12 drops. On 5th confusion of head, pressive pain in sinciput, heaviness in forehead. 6th, from 8 to 10 a.m., three liquid stools with severe

griping. During day increased headache, heavy feeling in chest, difficulty of breathing, frequent palpitation of heart. 7th.—Pressive pains in head with pressure on eyes; two watery stools in the day with severe cutting in bowels; frequent dry cough, occasionally with expectoration of bright red blood, but without pain in chest. 8th.—Headache continues; sleep but little disturbed by cough; heavy feeling in chest; difficult breathing; sometimes sighing; strong palpitation of heart; dry cough, with occasional expectoration of bright red blood; one loose stool. 9th.—Cough with slight bloody expectoration; breathing oppressed as yesterday; somewhat exhausted; internal anxiety; little appetite. 10th.—Only cough, not severe; no blood expectorated. 11th.—The cough continued, growing gradually less till the 15th, when it went off.—HENCKE, *Arch. f. hom. Heilk.*, XX, 1.

XXII.—Dr. Wachtl began his proving on 7th February by smelling for five or six minutes at a bottle filled with tinct. acon. After half an hour felt head confused; when standing a long drawn out violent stitch in the left heel, which spread up in the direction of the tendo Achillis to hough, recurred ten to twelve times, and at last became so violent that he must sit down, when it went off. The following night was restless. 12th, forenoon, 8 drops. Confusion of head, with hot feeling. Night restless; woke next morning with the same confusion of head, but notwithstanding took 12 drops. The confusion of head as before the outbreak of coryza lasted all day, together with a feeling of warmth in cardiac region; four loose stools during the day; night restless. Next day the head symptoms abated; forenoon, pinching formication on glans penis, and five or six violent stitches at orifice of urethra; noon, whilst at dinner, great pressure in stomach as from something indigestible; the sensitiveness and warm feeling in stomach lasted till evening. 15th.—Recurrence of the pricking formication in glans, and also a similar sensation at symphisis of sacrum and ilium, changing gradually into a paralytic pressive pain lasting nearly all day. At night sudden waking as from a frightful dream, with burning pain proceeding from stomach through the whole œsophagus to the mouth, lasting half an hour, and leaving a feeling of dryness. 16th.—Forenoon, dry heat, with anxious pressure in stomach, and sensitiveness of renal region. Urine seemed thicker and hotter, and was passed with slight burning in urethra. In bowels a loud gurgling and splashing as after a purgative. Night quiet. All these symptoms lasted the 17th in equal degree. Recurrence of the paralytic pressure in sacral region, relieved by moving and bending backwards. In forearm pricks as with fine needles. Afternoon, extraordinary drowsiness and exhaustion; not refreshed by three hours' sleep. After waking head much confused and dazed. Evening, nausea and sweet taste in mouth, relieved by hawking up mucus. At 7 p.m. pressure in stomach, alternating with splashing in bowels, followed by urging to stool. Stool insufficient, with no relief to the symptoms. Three attacks at short intervals of chilliness, beginning at middle of spine, and spreading to the lumbar muscles, and, in spite of warmth of room, feeling as after taking cold, with transient heat on head, followed by fine flying stitches in left hand and left shoulder-

joint. Night, constant starting up out of sleep, with trembling of heart, and hot feeling in pit of stomach, in between light slumber, but no quiet sleep. 18th.—Very exhausted; abdomen sensitive to touch, as if peritoneum were slightly inflamed. Noon, shooting pressure under sternum, and similar feeling between scapulæ. Many of these symptoms persisted during next eight days, some only momentary. Thus the flying stitches in shoulder- and elbow-joints were only for instants; more persistent was the confusion of head, the chilly feeling, the pressure in stomach, splashing in bowels, sensation of dry heat in whole body, with occasional chilliness over back. Constant were the pressive pain in lumbar region, burning on urinating, with thick urine, drowsiness with exhaustion, restless nights and variable humour. 5th March.—20 drops. Soon afterwards chilly feeling from crown down back to coccyx. After quarter of an hour general agreeable feeling of warmth in skin and sensation of looseness of ligaments of joints, causing unsteady gait, with flying stitches in left patella and left shoulder-joint. Burning when urinating recurred, more copious, and a kind of anxiety at commencement of micturition. Next morning after breakfast, pressure in gastric region, not lasting long; three soft stools with rumbling in bowels, as after a purgative, and sensitiveness in sacral region. Night restless. 8th.—20 drops. Thereupon pressive pain in head, sometimes more felt in occiput, sometimes at root of nose. Headache, sometimes shooting, lasted all next day. Lastly, scraping in throat and constant tickling in larynx when smoking tobacco. Although accustomed to smoke it always caused stupefication during the proving. 10th.—Night, the pain in throat increased, swallowing was difficult; in the morning the whole pharynx considerably reddened. Bruised pain in sacral region with pain in belly as from flatulence was pretty constant. Evening, difficulty of swallowing and redness of throat declined; the chilliness with marked prostration of lower extremities frequent; had to go to bed at 7 p.m. Slept well till midnight, after which had frequently starting out of dreamful sleep. At 5 p.m. great hawking of mucus with nausea, and lastly, twice vomiting of greenish-grey watery fluid. The exhaustion and prostration of limbs felt in bed. 11th.—On awaking heaviness on chest, and soon afterwards violent pricks in rapid succession in left half of chest from without inwards. During day shooting burning with hot feeling in region of coccyx and in hæmorrhoidal vessels, which lasted till next day. 12th.—Stiffness with bruised feeling in left side of neck to shoulder-joint and a part of the back, aggravated in bed and when lying, ameliorated by movement and open air. This lasted 13th, 14th, and 15th, but alternated from 14th with similar feeling in lower and upper limbs, and then suddenly sprang back to the first place. During whole proving had two or three times a day sudden congestion to head, with anxiety, whereupon the chilly feeling over back and extremities came on. Constant was fatigue when walking, especially going up stairs, during which must frequently rest on account of dyspnœa and hot feeling in lungs. Mind and disposition affected; sleepiness; dislike to mental work; crossness; anger about unimportant things; misanthropy and tendency to start

were constantly recurring. 3rd April.—30 drops. Immediately hot feeling in head, with chilliness over back; all day extraordinary exhaustion in whole body. 4th.—40 drops. Pressing pain in forehead and occiput, increasing towards evening. The next night restless. 5th.—Headache relieved, but prostration of whole body, so great in evening that must go to bed early. Next morning violent stitches in right half of chest with loss of breath, and during day repeated tinnitus aurium. 7th.—50 drops. Shooting pressure in left half of chest, with anxiety and warm feeling in cardiac region, frequently recurring all day. Night restless, disturbed by frequent starting. These symptoms returned twice the following day, but slighter. Towards evening tearing stitches in right knee-joint, and contused pain in right testicle. Next day nothing but tearing stitches in almost all joints, quickly changing, but very acute.—*Oest. Zeitsch.*, l. c.

XXIII.—Dr. Watzke took 10th January, forenoon, 1 drop of acon. tinct., and continued till the 16th, increasing the daily dose by 1 drop. 18th.—8 drops; 20th. 10 drops. Made no alteration in diet. 1 drop caused scraping in throat for several minutes, and a peculiar derangement of the disposition. Could not, even in society, get rid of anxious, fearful thoughts. He had, too, transient pressive pain in patella. After 2 drops, the scraping in throat was more marked and lasted longer (all afternoon and evening) and there were repeated stitches in throat and dull pain in vertex. Oppression of chest and frequent stitches in back. After 3 and 4 drops, besides scraping, swollen feeling and stitches darting through throat, oppression of chest, and predominant sadness. After 5, 6, 7, drops, no throat symptoms, but pressure and acute stitches in vertex, pressive pain in patella and tendo Achillis, oppression of chest and feeling of weight in stomach, the latter lasting one minute, and recurring several times in the day. 10 drops caused frequent violent eructations, increased thirst, feeling of weight in stomach with sense of compression in œsophagus (especially forenoon), dull pain in vertex, extending to temples increased by stooping, aching and gnawing pain in patella, melancholy disposition. After eating, after wine and coffee the symptoms disappeared. 22nd.—Forenoon, 15 drops. Soon afterwards prickling burning in palate, throat, and along Eustachian tubes increasing till noon, declining afternoon. Next night sleep very restless. 23rd.—Uvula much swollen, and with arch of fauces and posterior part of palate injected in a ramified manner. Saliva increased, compelling frequent swallowing. The pain increased by swallowing. Therewith oppression of chest, dull pain behind sternum, frequent deep sighing, sometimes dry cough. Throat pain worse when walking in open air, accompanied by troublesome pain compounded of burning, itching, and shooting in both ears, relieved by eating, returning in evening with increased intensity. All these symptoms continued though slighter next day, and were quite gone on 25th. 6th, 7th, 8th, 9th February, morning after breakfast, 20 drops. During these days the throat pain was constant. It began soon after taking the dose, was shooting and accompanied by feeling of swelling in throat. It lasted all day. It was as if an angular, many pointed body stuck in throat, uvula swollen, elongated, and the arch of palate and posterior surface of palate greatly

injected and dark red. At same time frequently during the day, for a minute at a time, very troublesome and acute pressive pain at both sides of vertex, forehead, lower jaw, most persistent and severe in right shoulder and right upper arm; feeling of exhaustion and heat in chest; frequent sighing, attacks of anxiety; sometimes dry cough and contractive shooting pain in right side of chest. In open air heaviness and stiffness of limbs, especially lower extremities; difficulty of moving; on treading heavily sensitiveness in lumbar region; occasionally when sitting sudden, constrictive pain in region of gall-bladder, taking away breath. Every forenoon, some hours after taking medicine, increase of sexual desire, which went off about noon. After eating, chilly feeling, exhaustion, drowsiness; night, increased heat, frequent tossing about in bed; sleep very broken, full of vivid dreams, distinctly remembered. Frequent transient itching, prickling, burning, scraping here and there in skin. Sometimes repeated going to sleep of right foot when sitting. 22nd.—15 drops morning fasting, the same an hour later. During the the day painful drawing here and there, most frequently on different parts of thorax and upper and forearms, weariness in arms and thighs, confusion of head, continued, but slight pressure in vertical region, scraping and constriction in throat, as if it were narrowed. Chest oppressed, must often sigh. Sometimes stitches darted through chest. Occasionally violent eructation. Sexual desire much increased. Evening, when passing from obscure room into street, flickering before eyes, the lamp-lights trembled and swayed. Difficulty of seeing the faces of passers-by. Anxious and giddy, feared to knock up against them. Thought he saw near objects worse, distant objects better than usual. The next night, sleep very restless, body felt hot, tossed about much in bed, and had very vivid remembered dreams. Dreamt he was playing whist, and when awake remembered all the cards in his hand. 23rd.—Felt pressure and tension in vertical region, took an hour after breakfast, 30 drops. All yesterday's symptoms except those of eyes recurred, but less severely. 24th.—40 drops, morning. Same symptoms. The oppression of chest was more persistent. When came from open air into warm room, irritation to cough in larynx and dry cough. The feeling of fatigue in thighs and arms more distinct and troublesome. 25th and 26th.—50 drops each morning at 9 a.m. Thorax painful externally in various parts, especially right side. Breathing sometimes very tight. Must sigh often. Deep breathing often hindered by feeling of compression in central anterior part of chest, or by persistent pinching together, especially in right side of chest inferiorly, or by violent stitches deep in hepatic region. Change of temperature excited dry cough, accompanied by sore pain in chest. The feeling of weight in stomach came on more severely and was accompanied by constriction in throat, and attack of nausea. When walking in open air, troubled by acute pressing pain, which alternated for minutes or quarter hours with same pain in left patella, right tendo Achillis, and back of left foot. Violent eructation of air, persistent pressive pain in vertex, restless nights with vivid remembered dreams, anxiety, laziness and prostration. The painful sensations of pinching, aching, pressing, gnawing on different parts of body, lasting minutes, were not unlike

what are caused by a pretty strong electro-magnetic apparatus. 27th and 28th, each morning. 50 drops. Soon afterwards feeling as if throat swelled, and as if a large quantity of mucus were there, which he could not get rid of by constant hawking; flow of frothy saliva into mouth; repeated violent eructation of air; frequent dry cough with sore feeling in chest, and sore pain in larynx; stitches in forehead, back, sides of chest, fingers, back of hand, and lower parts of body, as though he stood on the isolating stool of an electric machine, and sparks were drawn from him. Pinching together as with blunt forceps in several parts of left arm, near bend of elbow, for half hour, frequently recurring during the day. Itching in various muscular parts, especially forearms, as though he had hold of the conductors of an electro-magnetic apparatus, only the pain came and went away more slowly. Fatigue as after a long walk in thighs and forearms; pain of sacral and lumbar regions, tensive, aching, more felt when treading; violent very painful contraction about anus, but not resembling ordinary tenesmus; sometimes stitches darting through anus and urethra. Continual itching and smarting on various portions of skin, compelling scratching; here and there papules the size of millet seeds appeared, their apices filled with yellowish lymph and dried. Afternoon, drowsiness, prostration, feeling of pressure and weight in crown, disinclination to mental work. When walking a peculiar stiffness and heaviness of lower extremities; could not go at his usual quick pace, but sauntered slowly along the street. Nights always very restless, next morning felt a heavy pressure in vertical region, head heavy and giddy as after drinking strong wine the previous evening. 29th.—80 drops two hours after breakfast caused no new symptoms. But those of the previous days came with greater intensity, and the chest symptoms assumed a more serious aspect. Very frequent dry cough, especially on breathing deeply and in changes of temperature, combined with sore feeling behind sternum. The pressure and oppression on chest increased, especially towards evening, accompanied by drawing and stiffness in nape, and painfulness of scapula. Moderate wine drinking relieved the chest symptoms, but aggravated the head symptoms. Next night sleepless. Woke every quarter hour with confusion of head in vertical region, and dryness of mouth and gullet. Cutaneous temperature somewhat increased, drank much. 1st March.—Took 80 drops, the half at 9.30 a.m., the other half three hours later. Afternoon, violent pressure in vertical region, attack of vertigo, feeling in crown as if hair stood on end, that part was hot externally; chest symptoms as yesterday. Next night excessively restless. Great exhaustion after the restless night. The next fourteen days the same symptoms occurred as when taking the acon., only less intensely. Sleep during past week very disturbed, The most persistent symptom, besides the restless nights, was the tiresome pressive pain in vertical region. Oppression of chest and cough, generally dry, and only with slight mucous expectoration in the morning, occurred occasionally. More tiresome and frequent were the drawing, gnawing, shooting pains in limbs, especially forearms. Also the anxious sad humour came sometimes. The symptoms came in greater degree when walking in open air and towards evening, they were removed only for

hours by wine and coffee. 6th May, at 9 a.m., after breakfast, took 10 drops of 12x dilution, repeated the dose two hours later. No effects. The same dose at 2 and 7 p.m., also without effect; on the contrary felt unusually well. 9th.—10 drops of 10th dilution did nothing. 10th.—Evening, 10 drops of 8th dilution in half glass of water, took in course of day three tablespooonfuls, at intervals of two to four hours. Afternoon, repeated slight stitches in throat, head confused. Upper half of eyeballs sensitive, especially when moving eyes, as if they were pressed in from forehead. Stooping rather relieved the pain. Later, the feeling of pressure on crown, as if a cap were tightly pressed on head. This lasted till he went to bed at 10.30 p.m. On bending back head the pressure in eyeballs and crown changed into a severe but dull pain. Night very restless, with very vivid remembered dreams. Next day, towards evening, the throat and head symptoms returned; night again restless. The third day no symptoms.—*Oest. Zeitsch.*, l. c.

XXIV.—Helene Weinke, æt. 18, of choleric temperament, robust constitution, always enjoying good health, since her fourteenth year regularly menstruating, of sedentary habits and costive bowels, took 17th April, at 9.45 a.m., 1st dilution of aconite. No symptoms, except appetite for dinner better than usual. 20 drops of same dilution had no effect. 19th.—50 drops of same dilution. After half an hour when walking some shooting in region of spleen. 2 p.m., this shooting came more severely when walking, diminished on standing still, and went off when sitting. At 3.30 p.m. took 72 drops. All afternoon enormous thirst, and from 6.30 till 10 p.m. shooting in left lower half of chest, that only went off on lying down. 20th, 9 a.m.—10 drops of mother tincture. From 12 noon, shooting in side, alike when walking, standing, or sitting, lasting till 1.30 p.m. At 2.45 p.m., suddenly a moderate pressure in right lumbar region for a quarter of an hour. At 3 p.m. 20 drops tincture. Thereupon very good humour; evening, heat, sometimes in face, sometimes in œsophagus. 21st.—Morning, aching pain in throat especially when swallowing, also some stitches in side. 22nd.—On awaking great pain in throat, uvula and soft palate moderately reddened. The stitches in side continue slighter; much thirst, extraordinary fatigue. 10 a.m., took (with loathing) 20 drops of tincture. The loathing lasted till noon. At night had a long confused dream, unusual. 23rd, 10.30 a.m.—30 drops of the tincture. With exception of the throat affection, no symptoms except in evening a pappy stool, having had no stool for four days. 24th.—On waking, pain in throat much increased, the redness of the affected parts more intense, with dryness of them. The sorethroat to-day is more on the left side; at same time hoarse, dry, resonant cough, during which eyes water. Now and then burning of eyes, observed the last two days. Very restless sleep. 25th.—All day the cough very frequent, at same time symptoms of moderate coryza. 26th.—Sorethroat gone, cough better, but becomes more violent at 3 p.m., is dry and causes pain in larynx. The last three days during which she took no medicine, a normal stool daily, evening, burning alternately in either eye. Excessive thirst. At 10 p.m., shooting, pressive headache when coughing. After half an hour stitches in the

side. 27th.—Morning, stitches in side and cough, headache, weariness, and cross humour. The throat commenced again to be painful on left side. 28th.—At 1 p.m. increased sorethroat, with frequent swallowing of saliva, that increased so much in evening, that she took merc. sol. 3. After 10 p.m., rigor lasting three minutes, followed by general dry heat, and increased cough. After midnight restless sleep. 29th.—All better; when walking a tearing in right knee and thigh, that went off after one hour. The sorethroat, cough, and stitches in side went off completely in course of three days. During all the proving, there appeared very many heat vesicles on forehead, which sometimes were very painful.—*Oest. Zeitsch.*, l. c.

XXV.—Dr. Würstl, æt. 39, sanguine temperament, suffered in former years frequently from articular rheumatism, toothache, and on the slightest chill diarrhœa, but has been quite well latterly. 22nd Feb., 8 a.m.—6 drops of tincture of aconite. Immediately slight scraping in throat, for five minutes, nothing else. 23rd, 9 a.m.—12 drops. Somewhat more severe but transient scraping in throat. About 11 a.m. suddenly giddy when walking, thereafter slight throbbing in frontal region towards both eyes, for some minutes. Otherwise well, as he was also the next two days, when he took 12 and 15 drops. 6th March, 8.30 a.m.—15 drops. All day a slight coolness, which about 6 p.m. passed into chilliness, often recurring in course of evening; at same time rumbling in belly, and itching in rectum compelling scratching. Next day no medicine; symptoms continued. 8th, 9 a.m.—20 drops; forenoon, frequent vertigo; noon, slight chilliness (lasting till evening); afternoon, a soft stool; night, frequent waking without dreams. The chilly feeling, the loose bowels and tickling in anus last three days; in addition three vesicles came on the tip of the tongue, which burn for four days. 12th, 8 a.m.—30 drops. After two hours great confusion, throbbing and vertigo in head. After luncheon heat in head for half an hour. Afternoon again chilly, and evening, both knees are icy cold, with occasional transient stitches in them. Night, frequent waking, but he soon goes to sleep again. The cold feeling lasts next day, and at noon has suddenly sweet taste in mouth, and spits out a little bright blood. 16th, 9 a.m.—20 drops. Immediately great scraping and burning as from peppermint in throat and back part of soft palate (for a quarter of an hour); transient feeling of coryza; forenoon, frequent attacks of vertigo; in both knees slight drawing; noon, emptiness in stomach, with frequent eructations of air; then sudden chilliness, which goes off when eating; afternoon, diminished temperature of skin; frequent micturition, rumbling in belly with great urging to stool. The cold feeling, vertiginous attacks and loose bowels continue the next two days. 19th.—30 drops. Mucous membrane of soft palate seems puckered; clear water flows from nose frequently, this lasts till noon. Evening, chill for half an hour and frequent micturition. The next two days, always about noon, frequent attacks of vertigo; sometimes premonitory symptoms of coryza. 22nd.—Morning, 30 drops, some scraping in palate and throat for half an hour; forenoon, great confusion of head, transient heat and vertigo; noon, frequent yawning and eructation of air;

very good appetite for dinner; afternoon, feeling of exhaustion. The next sixteen days no medicine; almost daily, between 11 and 1 o'clock, attacks of vertigo with confusion of head; drawing in knees, calves, elbows, lasting a few minutes; constant sweet taste in mouth, with saliva mixed with streaks of blood; loose bowels with urging to stool; frequent itching in rectum with discharge of white, hot mucus; restless nights. 10th and 12th April.—40 and 50 drops. Each day, forenoon, vertigo; whilst eating confusion of head. 8 p.m., glowing of cheeks and pressive pain on both temples, with great sensitiveness of eyes for nearly one hour. The forenoon vertigo attacks, the sweet taste and coloured saliva, the itching in rectum with discharge of mucus, were the symptoms that only went off after fourteen to twenty days. Though disposed to rheumatic sufferings, almost no symptoms of this sort appeared, whereas the mucous membrane of fauces and of all the gastro-enteric track, especially of the rectum, was in a state of congestion with increased secretion.—*Oest. Zeitsch.*, l. c.

XXVI.—Dr. Wurmb took 10th February, 6 p.m., 5 drops aconite tincture; 11th and 12th, at 8.30 a.m. and 6 p.m., 5 drops; 13th and 14th, 10 drops; 15th, 15 drops; 22nd, 23rd, and 24th, 20 drops; 26th and 27th, 25 drops, regularly morning and evening. 11th and 27th.—Burning on upper lip, as from pepper, nothing on the other days. After 25 drops, dryness in palate and posterior nares, lasting half an hour; forenoon, on moving neck a drawing pain on left side of nape and left scapula; pressive pain in upper part of left side of chest; the muscles there are sensitive to touch. 28th.—30 drops, no symptoms. 6th March.—Twice 40 drops. The above sensation on lips and tongue for half an hour. Night, frequent waking with over-wakefulness, otherwise well. 8th, 9th and 10th, 45 drops; 17th, 60 drops; 18th, 70 drops, always twice a day, caused no symptoms, or at most burning on lips and tongue. 19th.—No medicine. At 7 p.m., stiff feeling in nape and chilliness, especially in hands and feet, lasting all evening. 20th.—Morning and evening, 80 drops. Morning, after taking the medicine, drawing pain in right hip-joint, which went off when at rest, but instantly recurred when moving and lasted till 2 p.m.; when it went off, a similar pain in right thigh, lasting till 6 p.m. During the day drawing pains in right tendo Achillis, left hip-joint and lower angle of left scapula, lasting but a short time. 21st.—Twice 90 drops; burning like pepper on tongue; evening, scraping in throat, going off on hawking up mucus. 22nd.—No medicine; morning on waking, confusion of head lasting half an hour; at 10 a.m. drawing pain in right thigh, lasting till 1 p.m., so violent when walking he had to stand still. 7 p.m., some acute stitches in right external meatus auditorius. From 23rd to 27th no medicine. All these days, frequent chilliness, stiff feeling in nape; drawing pains here and there, all these lasting but a short time. The most persistent symptom was a feeling as if a warm fluid escaped from anus. This occurred every day about twelve times. 28th.—No medicine; on waking in morning, a drawing on inner side of both thighs, becoming worse during the day, and was especially troublesome when walking. The thighs were painful to touch, as if sore. The feeling of a warm fluid flowing out of anus frequently

occurred. 29th.—Morning and evening, 100 drops. All day drawing pain on inner side of left thigh, but not so bad when walking as before. 30th and 31st March, and 1st and 2nd April.—Morning and evening, 100 drops. 1st April.—Morning, after taking the dose, burning on tongue and lips, as from pepper, lasting one hour; stiffness in nape for two hours; all day feeling of great weariness in feet, especially when at rest. 2nd, 9 a.m.—Drawing pain in right side of neck into right ear and right shoulder, lasting all day and very severe. At 11 a.m., scraping in throat, for half an hour; afternoon, feeling of warm fluid coming out of anus. From 17th to 22nd, at 9 a.m. and 5 p.m., each time 100 drops of 3rd dilution. 20th.—Feeling of warm fluid coming out of anus, frequently during day. Afternoon, drawing here and there in joints, lasting a short time; aching in chest sometimes right, sometimes left side; immediately after dinner obtuse stitches in brain, in right side of forehead, then in temporal region, lastly in occiput. 21st and 22nd.—Only occasionally the above sensation in anus.—*Oest. Zeitsch.*, l. c.

XXVII.—Professor von Zlatarovich, 37 years old, robust constitution, dark complexion, sanguine choleric temperament, had suffered in childhood and youth frequently from ague. In 29th year had typhus, convalescence lasted five years, slight lymphatic and varicose swellings in right leg alone remain. Began with 5 drops of tinct. acon., increased gradually to 10, 15, 20, 30 drops, always taken in morning before breakfast in a spoonful of water. The first days no symptoms. Eighth day (he took 10 drops) soon a peculiar headache in crown; he felt as if he had a pitch cap on the head which compressed it equally from all sides, lasted two hours and went off when moving in open air. Next day slight recurrence of the same feeling, more like a formication, never had anything of the sort before. The first and second days, when he took 20 drops, soon scraping and contraction in uvula and soft palate, compelling frequent hawking and spitting, with occasional inclination to vomit, lasting some hours. 20th February.—30 drops; forenoon, feeling as if a warm fluid like blood exuded from anus, though it was actually dry. (A dry cough for two days, probably effect of a chill.) All the time unusual cheerfulness and very active mental power. 4th March.—On waking, 50 drops. Warm feeling in stomach (from the alcohol?); forenoon, when lecturing sensation as if head were compressed by screws from both sides, forehead quite free. Later, when walking, chilliness; tense distended abdomen; flow of water into mouth, feeling of general malaise. Relieved by drinking wine. Next day after a similar dose, frequent violent sneezing, nothing more. 13th.—80 drops. Scraping and itching in soft palate, compelling frequent hawking and spitting, like commencing angina tonsillaris, for some hours. Sexual desire increased, cheerfulness of disposition, the mental functions performed with unusual strength and duration. An itching of the anus, with hæmorrhoidal tenesmus, from which he frequently suffered, has completely disappeared since proving the acon. 14th.—100 drops. From afternoon till evening chilliness as if between skin and flesh, especially over back and abdomen, felt even while perspiring after quick walking. 15th.—100 drops. In the evening merely slight drawing

in temporal muscles, for one hour. From 16th to 20th, daily 120 drops; nothing occurred except on 20th, after taking the drops, scraping in throat with hawking and inclination to vomit for one hour; crawling as from ants in head, especially temporal region; on turning head, tension in cervical muscles, especially sterno-cleido-mastoid, and at its insertion in mastoid process. All through body a peculiar sensation, as when in a vapour bath the steam falls rapidly down on the skin, and drops are felt on it. Frequent discharge of clear fluid from nose (without coryza). From 21st to 25th, daily 150 drops. On 22nd, soon after the drops, chilliness coursing along the spine, with goose skin, till noon, and formication over the galea aponeurotica; hands and face blue; heat of stove grateful; he soon loses the feeling of stability, felt as if the feet would rise up. Whilst trying to stand on one foot or the other, he slumbers when standing for a moment, which suffices to spread a feeling of comfort over the whole body. Forenoon, feeling on breathing as if the air-passages were uncommonly wide, so that the air can pass with extraordinary facility in great streams out and in at each breath. 23rd.—Only creeping and crawling over the whole body. 24th.—The same sensations, immediately after taking the drops, accompanied by tiresome rather than severe shivering, here and there, especially in upper arms and legs; contraction of temporal muscles, creeping in scalp; involuntary pressing of lower against upper jaw, with flow of saliva into mouth. Noon, after a short walk, vertigo, with commencing staggering. Drawing from temporal muscles to external meatus auditorius, with feeling of tension there. Some painful jerks in occiput. 25th.—Only slight reminiscences of yesterday's symptoms. 26th.—More than 150 drops. Abont 11 a.m. when walking in open air, chilliness all over body and goose skin; gait unsteady, sight rather misty. These symptoms aggravated on coming home and sitting. Head warm and feels small, like that of a child, when supporting the forehead in the open hands. Drawing in whole head, especially in temporal muscles and behind ears. Creeping in the galea aponeurotica; crawling as from ants over back, upper arms, and thighs; tips of fingers and toes as if numb; abdomen distended and tense; disinclination to speak; lower jaw firmly pressed against upper jaw; nose quite dry. Symptoms relieved by soup, and by eructation with taste of medicine. Pulse 72, contracted, hard. Noon, feels well, with frequent erections and greatly increased sexual desire, almost to emission of semen, though coitus had been performed towards morning. Afternoon, while walking in open air after a moderate meal, headache for one hour. 27th.—170 drops. All forenoon, giddy, especially in open air. Creeping and crawling over whole body; he feels the roots of his hairs; towards noon, sleepy; head as if pressed together, as if the galea aponeurotica were too tight; transient itching and pressure in hæmorrhoidal vessels. 28th.—180 drops. Exactly the same symptoms as yesterday except the hæmorrhoidal sufferings. Lower jaw drawn against upper jaw; teeth sensitive to the air; constant creeping and crawling, especially in right lower limb; occasionally feeling as if the epidermis were separated by a thin layer from the skin; retraction of scrotum; evening, slight heartburn. 29th.—Morning, 200 drops. About 11 a.m. heat all over

body, anxiety in cardiac region with quicker and stronger heart's beats; flickering before eyes; tension and slight pain in right calf; sexual desire. About 1.30 chilliness, head rather giddy; thoughts very flighty, even at the slightest cause. 7 p.m., quite well. 30th.—120 drops, at 10 a.m. Sometimes slight chilliness; evening, pressure in hæmorrhoidal vessels; abdomen less tense than yesterday; the skin, especially of hands, seems more smooth and elastic; next morning on waking in bed, loud rumbling and grumbling in bowels; after rising discharge of flatus with relief. From 31st March to 6th April, daily in the morning, 200 drops. 31st.—After two hours chilliness and formication, especially betwixt shoulders and down back, aggravated by movement, like the commencement of an ague fit, at same time tips of fingers and toes cold; several violent dry coughs; scalp as if swollen and numb; uncommonly easy breathing; exhilaration alternating with depression. 1st April.—On waking in morning, very tiresome heartburn, almost preventing respiration, ameliorated after rising. About 11 a.m. chilliness, especially on back and upper arms; oppression of chest and palpitation of heart, lasting a short time only; towards noon head confused as after too free indulgence in spirituous drinks; heaviness and tension in calves, especially right; frequent micturition. About 1.30 p.m. right lower limb very heavy; painful pressure in hip-joint when walking; in left lower limb drawing pains here and there; chilliness between shoulders in warm room; fingers and nails cold and pale, like those of a corpse. 2nd.—Soon nausea and inclination to vomit. Breakfast not relished. Abdomen much distended, some chilliness, very cheerful. Towards noon crawling and creeping in whole cutaneous surface; retraction of scrotum; sexual desire; frequent sighing on account of distinctly felt accumulation of blood in lungs. 3rd.—Soon pressure and tension in soft palate and fauces, as from swelling of those parts, for but a short time. After one hour transient stitches in lower part of chest, about false ribs; cough from irritation in larynx with expectoration of gelatinous, formed mucus; then sensitiveness of larynx to inspired air, as if it were deprived of its protective covering, lasting but a short time, at same time feeling of tension in lumbar region, causing him to bend backwards. About 10.30 a.m. coldness in hands and feet; shiver over whole back, whilst head and abdomen are warm. One hour later, coldness all over body, face pale and fallen in; tension in right groin; pressure on root of nose; præcordial anxiety; heart's beats felt. The cold gradually spread all over lower extremities; the fingers feel like a corpse. All afternoon cheerfulness and feeling well. 4th.—Immediately inclination to vomit for ten minutes, could with difficulty refrain from vomiting. Soon after this had gone off rumbling and shooting contractive pain here and there in bowels. During and after early coffee, frequent violent cough without expectoration, though once a little fluid came into mouth, having a peculiar sweetish salt taste, felt most at the root of the tongue, thought it was blood, but it was not. After three hours feeling of coldness in hairy scalp, which passed gradually into the former contraction of the galea aponeurotica; pressive pain in right hip; itching in hæmorrhoidal vessels; pressure in occiput; violent cough, during which the

anus contracts spasmodically. Forenoon, when walking, often giddy as if intoxicated, when he comes into house the vertigo changes into stupefied feeling. When walking single transient stitches in urethra; occasional pain in hip; when sitting after violent exercise oppression of chest and præcordial anxiety with contracted pubes. 5th.—After one hour single transient stitches in urethra, momentary colicky pains, burning pains in right foot. After three hours coldness all over body, especially back; at same time very easy breathing with wide free chest. Afternoon, for several hours drawing pain in border of left ilium, which sometimes spreads to hip-joint. Evening, when sitting and writing the pain leaves this part and wanders about the body, going into nape at one time, at another into loins, then into bowels, then into groin, then into another joint, always changing with great rapidity, so that it is never longer than at most a few minutes in one place. 6th.—After a good sleep rose quite cheerful and feeling quite well. Though he took 200 drops to-day without repugnance, later the idea of the medicine excited loathing and inclination to vomit, and then came on such a disagreeable feeling in stomach and discomfort through the whole body that he resolved to cease taking the medicine. The same forenoon when walking, rigor all over body, with paleness of face and fallen in features; itching and burning in eyes and lids, inviting rubbing; eyes very sensitive to air, not to light, the eyeballs felt enlarged as if protruding from orbits and stretching the eyelids. When walking drawing pain in lumbar region, relieved by bending small of back. After four hours gnawing pains in right clavicle for half an hour. Evening, crawling and biting all over skin, here and there, as from fleas, most persistent in the hairy parts, with the exception of the scalp, compelling him to scratch. 7th.—No medicine. Forenoon, when walking (though well clad and in the sun) great coldness all over body, with slight drawing in lumbar region and about ankle. 8th.—Quite well all day. 9th.—On coming from the lecture at 11 a.m. he felt extremely disagreeable restlessness. He felt extreme hurry; anything that prevented him walking quickly was extremely disagreeable, so that he rudely pushed against those who did not get quickly enough out of his way, and ran breathlessly up stairs. Even when he got home this great hurry in all movements continued until 1 p.m., when his usual calm returned. He must then breathe deeply, without exactly sighing, he felt as if he must give his circulation through the lungs an impulse. About 1.30 p.m. he felt weak, chilly, and drowsy; after dinner (2 p.m.), he felt quite well. 11th.—On waking in morning, a violent headache on a small spot over the left eyebrow. After half hour he fell asleep again for a short time, and when he awoke the headache was gone. Forenoon, quite well. After dinner general discomfort; coolness, especially in hands; prostration and weakness in all limbs; frequent stretching; head warm and confused; wishes to be alone; drawing pain here and there, but only very transient. At 6 p.m., when waking, he got so cold that he must go out to warm himself by exercise. Chest oppressed, with sore pain under sternum on breathing deeply. 15th.—Took 10 drops of 2nd dilution of acon. No symptoms. 16th.—20 drops. Towards evening great weariness of feet. 17th.—20 drops. Morning

on rising, acute lancinating stitches in cardiac region, and apparently in the pleura costalis, preventing standing up straight and deep inspiration, with irritation to cough. After rubbing the skin, and making occasional attempts to breathe deeply, this went off gradually, but the corresponding parts of the thorax remained sensitive to external pressure. All forenoon well. After dinner, heartburn, with some sore feeling in stomach. Evening, transient stitches here and there on the ribs, in abdominal integuments and joints; great distension of the sensitive abdomen. From the 18th he increased the dose, and on the 22nd and 23rd he took 100 drops of 2nd dilution. Scarcely a day passed that he did not have remeniscences of the the former symptoms. Especially constant were drawing pains in whole body, especially in joints of lower extremities and frequently recurring chilliness. 23rd.—Came out of college with the most violent headache. Eyes as if with a veil before them. The pain was chiefly in the upper frontal region, was pressing and contractive, head not hot; face puffy and pale; light and noise increased the pain. He lay down in bed in a dark room, and the pain gradually went off in quarter hour. He slumbered a short time and awoke free from pain; the whole body cool. 25th.—No medicine. After a good night, at 7 a.m. pressive pain in region of left second rib, near sternum, confined to a spot the size of the palm, increased by deep inspiration. Drawing in tendinous expansions of lower extremities. The pressive pain recurred several times in forenoon, but soon went off. 26th.—100 drops of 2nd dilution. Morning, after rising, an acute pain in right forearm along flexor tendons of little finger, increased by movement, going off in half hour. 27th and 28th.—Daily 100 drops. Occasional transient oppression of chest. 29th and 30th.—Daily 200 drops. 30th.—All forenoon pressive contractive headache spread over the whole skull, especially left side and above left eye, relieved by application of cool hand.—*Oest. Zeitsch.*, l. c.

XXVIII.—Dr. Potter took 3 drops of acon. 3, every five minutes for 1¼ hour. After the first dose became fidgetty and nervous; then came great and causeless apprehension on account of his wife who was out on a visit; headache, vertigo, and great sensitiveness to odours supervened. Became so nervous and anxious that he could not work, a voice outside his window caused him to start, and he then fell back faint, with dimness of vision. Could not sleep.—(*Hahn. Monthly*, September, 1880, p. 532.)

XXIX.—H. W. Robinson made, between 12th December, 1862, and 24th February, 1864, a desultory proving of aconite in various doses from the mother tincture to the 2000th. There must, as he himself observes, have been something wrong about the tincture he employed, as he took as much as 50 drops for a dose without observing any effects. On the other hand, the doses of the high potencies (1000 and 2000 Jenichen) were followed by numerous symptoms, which casts suspicion on the genuineness of the proving. I have only therefore admitted into the Index those symptoms that corroborate the observations of others, but the following is a summary of the record: After 10 drops of tincture, several times a day, for three days, he had a slight burning under tongue. Then after several doses of the 1000th, fine sharp pains in different parts of abdomen

as from flatus, and loud rumbling of flatus. After numerous doses of the 1000th and 30th: confused vertigo all day; feeling like a drop of hot water in left ear; hard stool. More doses of the 1000th were followed by burning sensation in pharynx; heartburn in stomach; some sprained feeling in joints of right hand; feeling of heartburn all down back. After 15 drops and upwards of tincture, extreme oppression in pit of stomach all day, as of excessive repletion; feeling as if nothing could pass farther than the stomach; bowels much constipated; several white stools, frequent desire to evacuate; numb tingling sensation in arms and hands, as though the poles of a galvanic battery were being held; burning of tongue; formication and tingling in fingers. After 50 drops of tincture, burning of tongue; slight chilliness; excessive restlessness and tossing about for several hours; formication in hands and arms. After repeated doses of 1000th, at midnight, burning in back of throat causing him to hawk; hoarseness; burning in fauces; fine needle pricks in left hypogastric region; lame sprained feeling in right metacarpus; seminal emission. After the dose, went off suddenly in an unconscious swoon while standing up urinating; all the blood seemed to rush to the head, and he fell heavily to the ground. Frontal headache all day, worse in evening; headache confined to left frontal eminence; restless and disturbed sleep, strange dreams; single stitches in right under surface of tongue; strange intermittent growing-like pains in distal joint of left forefinger; cold feel in incisors; great nervousness; extreme sense of repletion; fainting feeling when urinating; strange dreams, awoke laughing. Olfaction of 2000th followed by momentary sticking pains in right eyeball during half an hour: transient lame pains in both metacarpi. After two doses of 2000th; fainting fit directly after urinating, everything wheeled round him and he lost all consciousness, hands and face covered with cold sweat, he remained for some time quite prostrated; stinging itching little red pimples on back of both hands like fleabites. After two more doses, transient pains like bone-pains in both metacarpi and in long bones of upper and lower extremities; two emissions in one night, very wakeful and restless. After several more doses of 2000th: rheumatic-like stiffness of right forefinger lasting ten minutes; strange sensation down forepart of both thighs, as if drops of cold water trickled over them, momentary tingling numbness of tip of tongue; sharp, transient and rheumatic-like pain in anterior part of left ankle-joint; momentary drawing in right forefinger; the intestines feel paralysed and unable to propel their contents, more particularly in transverse colon, stool not hard; sharp momentary pricks in glans and prepuce; drawing lame pains in right forefinger. Olfaction of 2000th followed by transient, but painful aching in left kidney; rough feeling like sand in left inner canthus; repeated sharp painful shooting in right fourth toe; itchy nettle-rash-like eruption on back of both hands; momentary drawing pains in left middle finger and right heel. After taking some doses of 2000th: several sudden flying stitches in glans, as though the poles of a battery had been applied there; raw scraping feel at back of throat, with constant desire to hawk, lasting twelve hours; extremely nervous, fearful and irresolute; tremulousness and

vertigo; great confusion of thought and action; great sensitiveness to draught of cold air; feverishness, powerlessness and prostration; drawing pains in right thumb; short dry cough. The feverishness increased during night, but abated in morning; flying growing-like pains in metacarpi and finger-joints of both hands; inward fever attended by chilliness, better in open air; rumbling of flatulence in bowels; sharp stitches in third and fourth right toes; slight running coryza and lacrymation; alternations of heats and chills all night; restless sleep; frequent sneezing, profuse nasal discharge, sense of extreme stuffing in head; anorexia; better in open air, but feverishness returned in room, pulse rose from 95 to 112; flying pains all over; weariness, languor, no inclination to rise off the couch, or to work; skin dry; short, frequent, distressing, and uncontrollable cough, without expectoration; hoarseness, partial loss of voice; all feverish symptoms aggravated in bed; violent coryza and lacrymation; harsh dry cough; slight irritation of edges of eyelids, great lacrymation; discharge of thick yellow mucus from nose like old coryza; several sharp flying stitches in third and fourth toes after getting into bed; lancinating pains in right big toe, also in third and fourth right toes, and in metacarpal bones of left hand, great nervousness and agitation; rheumatic-like pains in elbow-joint; clay-coloured stools; paralysed inactive feeling in intestines; nausea, want of appetite; aching growing pains in whole body; urine thick, sedimentous and reddish; skin on left side of scrotum studded with small vesicles pouring out a humid discharge; bruised pain in right testicle, and transient sticking pain in left side of prepuce; sticking pains in posterior fauces; extreme chilliness all day.—(*Brit. Journ. of Hom.*, vol. xxiv, p. 678.)

XXX.—J. F. B—, healthy, pulse 70; took 2 drops acon. ϕ, at 11 a.m. 11.5.—Pulse 78. 11.15.—Pulse 90, hard and thin; slight rigors along spine, internal heat with external coldness and pallor. 11.25.—Great restlessness, numbness of left arm, oppression of breathing. 11.45.—Sharp pain in ears with heat and redness of cheeks, anxious and uneasy; desired fresh air. 12, noon.—Asthmatic breathing, palpitation of heart. 12.15 p.m.—Drawing pains in extremities; stinging pains in throat with thirst. 12.30.—Sight of food causes nausea. 1.20.—Pulse 84, occasional stitches through chest when inspiring. 3.—Stitches and soreness in hepatic region, with heat in abdomen; soreness and stiffness of muscles all over. 3.15.—Pulse 80, perspiration on face and hands without cause; feeling as if diarrhœa would occur. 4.15.—Urine scanty. 6.30.—Pulse 75, urging to stool, copious, with colic and tenesmus; perspiration increased after stool. 8.45.—A second call to stool, watery and copious, with complete relief of all symptoms.—(WOODWARD, *Journ. of Intern. Hom. Conv.*, 1881, p. 36.)

ACONITINE PROVINGS.

I[a]. Dworzak took 0·05 gram. German aconitine. Bitter taste lasting a long time. Biting burning sensation in lips and tongue. Immediately eructations and rumbling in bowels; head and face warm; warmth

extending over rest of body, most intense in gastric region. Then drawing pressing sensation in cheeks, upper jaws and forehead, increasing gradually in intensity, alternating with actual pain, at first transient, finally steady and severe. Pulse at first along with warmth, more frequent, soon sinking below normal, small, weak, and occasionally dicrotic. Pupils first unusually mobile, finally very much dilated. Fulness of head, ringing in ears, sense of pressure in them; giddiness, distraction. Flow of ideas sluggish, long reflection impossible, power of attention impaired. Head- and face-ache much increased by mental exertion. Relaxation of limbs, muscular exertion accompanied by great fatigue and prostration, and by increase of pain in head and face. Flow of urine increased.—SCHROFF, *Prager Med. Vietelj.* xi Jahrg., vol. 2, p. 153, 1854.

II[a].—Heinrich, 0·05 gram. of same aconitine. Bitter taste immediately. In ten minutes burning on tip of tongue and lips. Pulse first accelerated, afterwards slower, falling in one and a half hour to 47. Whole body warm, perspiration, head dull and heavy, exhaustion and weakness, crawling sensation in face, feeling as if epidermis were scaling off; red spots on skin like punctures; pupils dilated, pain in head and face, roaring in ears, weakness of muscles, difficulty of respiration. After two hours, eructations and rumbling in bowels. After supper burning all over mucous membrane of mouth. Head- and face-ache lasted all evening, also debility, sleep disturbed. Next day pain in head and face returned, with forgetfulness, and trembling of legs. A dose of 0·01 gram., followed by inclination to cough, cough with easy expectoration, dryness of throat, eructation and exhaustion.—*Ibid.*, l. c., 1854.

III[a].—A large but lethargic man, aged 54, lamed by chronic sciatica. The pupils were a little unequal; at a given light the right was $\frac{1}{8}$, the left $\frac{1}{7}$. The pulse was 66, regular, of good volume and power; the respirations 16 to 17. 1. The $\frac{1}{200}$th of a grain of Morson's aconitia, taken by the mouth at intervals of three days, always caused slight tingling in the mouth and face, coming on within an hour and lasting for two or three hours. On another occasion, after the $\frac{1}{175}$th of a grain, a faint glowing feeling in addition was perceptible throughout the body, and there was a little somnolency. On another occasion, the $\frac{1}{150}$th of a grain converted the glowing feeling into a numbing glow—a comfortable feeling as if he were going off to sleep, and, if he did not move about, actual somnolency. These effects attained their maximum two hours after the dose; he felt warmer while they continued, and there was at the time and afterwards some difficulty in voiding urine. 2. The pulse being 66 and the resplrations 17 he took gr. $\frac{1}{150}$, and did not rise from his chair for three hours. After forty minutes the pulse was 60, unchanged, the respirations 17; somnolency was coming on. After one and a quarter hour, pulse 58, unchanged; respirations 16; pupils unchanged. He had slept for twenty minutes; a general glow pervaded the body. After three hours pulse 56, unchanged, unaffected by deep inspirations; respirations 16, regular. The glow and somnolency continued, and he had dozed several times; the tongue and pupils were unchanged, and he felt comfortable throughout. 3. On another occasion, after sitting still for one and a half hour at

the end of which time the pulse was 60, the respirations were 17 to 16, took gr. $\frac{1}{100}$. After one and a quarter hour the pulse was 54, unchanged in volume and power; the tongue and pupils unchanged. After three hours pulse 52, of initial volume and power; the respirations 16, natural; pupils very slightly dilated (?). He felt warm and dozed much after the medicine. 4. He took gr. $\frac{1}{80}$ repeatedly, at intervals of three days, at 9 a.m. The effects were uniform. The medicine "upset him" very much all day; he felt languid and sleepy; he could not hold his head up or keep his eyes open. He was giddy, and could not walk across the room without help; the vision was hazy; the erect position induced nausea. He could not eat much on the medicine days on account of a difficulty of swallowing and a pain in the back of the neck and behind the jaws in the parotid region, so that in eating he had to press the back of the neck with his hand. A glowing, tingling feeling pervaded the body, and there was a burning feeling in the gullet, as if a hot coal were there. The tingling in the mouth and face came on within half an hour, the somnolency after one and a half or two hours. At first he slept for an hour, but afterwards the sleep was dreamy and broken. The giddiness, dimness of vision and muscular weakness were most marked within the sixth and tenth hours. There was always some dysuria, and occasionally retention with hypogastric pain. Nausea was generally a prominent symptom, and the pain in the neck often remained until the next day.—J. HARLEY, *St. Thomas's Hosp. Rep.*, v, 146.

IV[a].—F. G—, aged 12, a well-developed boy, afflicted with epilepsy. The $\frac{1}{100}$th of a grain of Morson's aconitine given repeatedly at intervals of three days produced the following effects: After three quarters of an hour a tingling pricking sensation running up the legs to the spine and head, and tingling of the fingers, much giddiness and somnolency, but the sleep was disturbed by frequent awakings. After two hours he was unable to walk or even stand without great exertion, and on rising from the recumbent posture he was unable to see for a minute, and there was nausea. The effects lasted for seven or eight hours, after which he slept quite comfortably, and felt quite well the next day. I was unable to discover any influence on the breathing, pulse, pupils or tongue, nor was there any diminution of temperature.—*Ibid.*

V[a].—A man, at 8.30 a.m., took 6 granules of Hottot's aconitine of a half-milligramme each; pulse 68. 8.40.—Feeling of heat in the stomach. 8.50.—General malaise, yawnings, eructations, turns of nausea. 9.—Greater heat heat of the stomach; pulse 76; burning sensation at the tip of the tongue, general debility, muscular enfeeblement, turns of nausea. 9.10.—Burning of the lips, throat, and the whole buccal mucous membrane. 9.15.—Creepings in the face and fore-arms; pulse 84. 9.30.—Oppression, headache, feeling of acridity and burning of the throat much more marked, salivation. 10.—General depression, great muscular enfeeblement, sweats; pulse 68; turns of nausea, vomiting. 11.—Creepings in the face, which seems swollen and tense, also in the fore-arms and hands, which are benumbed and heavy; pulse 60. 12.—Breathing irksome; pain at the temple and along the course of the supra-orbital nerve; abundant perspirations; pupils not

dilated; burning sensation very painful in the whole mouth and larynx; the lips are benumbed; abundant salivation, entire want of appetite, occasional nausea. 1 p.m.—Same symptoms; complete prostration of strength, heavy gait, general enervation, a slight tendency to sleep. 3 p.m.—Headache with constriction at the temples, pupils dilated, respiration difficult; pulse 52. 5 p.m.—Same symptoms; sensibility appears to diminish, especially in the hands and cheeks; the mind is clear, no drowsiness. 7 p.m.—The symptoms appear to amend, the head clears, the creepings diminish, the depression is less; pulse 60. 8 p.m.—There is a marked improvement, the respiration is easier, the acridity, dryness and burning of the throat are less pronounced, there is, however, feebleness and general lassitude; the pupils remain dilated; pulse at 68. 8.30.—Easy sleep without agitation or dreams. The following day on waking there remain no traces of the effects of aconitine.—HOTTOT, *L'aconitine et ses effets phys.*, 1863.

VI[a].—Reil dissolved gr. $1\frac{3}{5}$ of German aconitine in 200 drops of alcohol, and took from 5 to 30 drops (gr. $\frac{1}{20}$ to $\frac{1}{4}$), diluted with water, in gradually increasing doses. He experienced a feeling of fulness in the cheeks and temples, which by degrees was exchanged for a painful sense of tension, formication, and prickling; the temples throbbed, the head ached, the eyes felt strained, the pupils were dilated, the sight was obscure, there was oppressed and sighing breathing, ringing in the ears, and increased urination. There was also a sense of heat in the stomach, with eructation, and, for three days following, nocturnal pollutions, to which the experimenter was not accustomed.—REIL, *Stille's Mat. Medica*, ii, 311.*

* The above do not include all the recorded cases of poisonings and provings of our medicine, but only such as appear to be recorded with sufficient definiteness to be available for therapeutic purposes. General statements, such as are to be met with in works on Toxicology, Materia Medica and Pharmacodynamics, I have not thought it necessary to reproduce. That some of the physiological properties of aconite had been ascertained by experiment at a very early date we can see from Nicander's (B.C. 181-135) statement that it causes astringency of the lips, palate and gums, gnawing pains at the stomach, singultus, flatulence, running from the eyes, double vision. Paulus Aegineta gives a somewhat similar account of it: "Wolfsbane, immediately after being drunk, occasions a sensation of sweetness on the tongue, with a little astringency; vertigo supervenes, more especially when the person attempts to rise up, and it brings on a watering of the eyes; there is heaviness of the chest and abdomen, with eructations of much flatus."—(Adams's *Paulus Aegineta*, ii, 220). Colonel Yule has directed my attention to a passage in a rare old book entitled *Les Observations de plusieurs Singularitez (etc.) trouvées en Grèce, Asie, Iudée, Egypte, Arabie (etc.), par* PIERRE BELON DU MANS. Paris, 1554.

(At Alexandria.)

"Entre les singularitez que le Consul des Florentins me monstra, me voyant chercher les drogueries, me feit gouster d'vne racine que les Arabes nomment *Bisch*; laquelle me causa si grande chaleur en la bouche, que me dura deux iours, qu'il me semblait y auoir du feu. Plusieurs modernes ont presque meurdry les aucteurs Arabes pour ceste racine; et leur ont tant donné de desmenties et faict d'iniure à tort, qui avoit honte de le dire; et toutes fois eux memes ne la cogneurent jamais. Elle est tres petite, comme vn petit naueau; les aultres l'ont nommée Napellus, qui est si commun aux drogueurs Turcs qu'il n'y a celuy qui n'en vende."—P. 97.

INDEX.

In the following index, the cases of poisonings are distinguished by Arabic, those of provings by Roman numerals. The poisonings and provings of aconitine are further distinguished by a small [a] attached to each figure. The figures refer to the poisonings and provings described in the second part of this article. The provings of Hahnemann recorded in his *Materia Medica* are indicated by the letter H, those of his disciples by a numeral attached to that letter, thus H^1 stands for Ahner, H^2 for Gross and Stapf, H^3 for Fr. Hahnemann, H^4 for Hornburg, H^5 for Rückert, H^6 for Wahle. The index is rather more than a repertory, and rather less than a regular schema. The symptoms are given in sufficient fulness to be useful as a guide to assist the practitioner, but not sufficiently full to enable the student to dispense with a reference to the records, if he wishes to obtain a thorough knowledge of this interesting medicine. The list given at pp. 12, 13 of the numbers by which the different record are indicated, may be of use in saving the reader some trouble in his study of the drug.

DISPOSITION.

Uneasiness (27, xxx).

Anxiety (1, 9, 14, 19, 23, 58, 64, iii, iv, v, ix, xii, xxi, xxiii, xxx).

Anxious fearful thoughts (xxiii).

Anxiety, feels as if some great misfortune would befal him (ix).

5. Fear of some impending misfortune (H, xxviii).

Anxiety and restlessness 12, 13, xxviii).

Anxiety and peevishness, with fine shooting in the side of the chest; then beating in scrobiculus cordis, then aching pain in head (H).

Terror and anxiety (38, 49).

Fear lest he should fall (H).

10. Tendency to start (xxiii, xxviii).

Excessive tendency to be startled, aft. ¼ h. (H).

Agitation (59).

Excitement (63, 66).

Intolerance (22).

15. Impatience (12).

Obstinacy (H).

Fretfulness (31).

Very irritable and quick in replies (3^a).

He takes every joke in bad part, aft. 3 h. (H).

20. She is extremely disposed to be cross, aft. ½ h. (H).

Crossness in morning (xxiv).

Very cross in evening (ii).

Crossness and sensitive irritability (xvi).

Cross at slightest cause (xxvii).

25. Crossness, anger about trifles (xxii).

She becomes quarrelsome (H).

She makes reproaches (H.)

Quarrelsomeness, alternating from hour to hour with silly insanity, he chatters childish nonsense, and is extravagantly merry (H).

Angry disposition (H).

30. Cross, everything is disagreeable to him (xii).

Morose, inclined for nothing, depressed spirits, even when walking (H^4).

Morose, as though she had no life in her, aft. 2 h. (H^3).

The slightest noise is intolerable to him, aft. ½ h. (H).

Music is intolerable to her, it goes through every limb; she becomes quite melancholy, aft. 24 h. (H).

35. Depression, out of humour (xii).

Sadness (xxiii).

Low spirited and miserable (63, xii).

Mental depression (16, 38).

Solicitude, grief (H).

40. Thought he must die (1, 3, 6, 7, 19, 20, 38, 39, 44, 69, 2^a).

Lamentable fears of impending death, from 2 to 12 h. (H).

Felt wretched and inclined to destroy himself (63).

Misanthropy (H, xxii).

Anthropophobia aft. 3 h. (H).

45. Groaning (34).

Peculiar clear, short moaning (3^a).

Inconsolable anxiety, and piteous howling, with complaints and reproaches about trifling evils, aft. 5 h. (H).

Piteous anxious complaints, with cowardly fears, despair, loud whining, weeping, bitter complaints and reproaches (H).

Paroxysms of sighing (24).

50. Crying violently (24).

When roused gave a sharp scream, and uttered some expression of distress (65).

Extreme hurry (xxvii).

Wandered about the house, and did things hurriedly (4).

Internal restlessness and anxiety (viii).

55. Restless, anxious, then furious (5).

Excessive restlessness, could not remain in one place (19, xiv).

Tosses about restlessly and constantly changes position (12, 34, 53).

Extreme restlessness, it twitches him up and compels constant movement (iv).

Restlessness (22, 22½, 23, 28, 51, 52, 53, 58, 67, 3^a, iii, iv, vii, ix, xiii, xvi, xxvii, xxix, xxx).

60. Tossing about (23, 31, 34, 58, 3^a, iii, xvi, xxiii, xxix).

Tossing about arms (10).

Extreme restlessness, so that he walked about his room almost all night, like a mad person (vii).

Composed, staid, though not cheerful humour, aft. 8 h. (H).

Very cheerful humour (ii, xiv, xxiv, xxvii).

65. Becomes gay and inclined to sing and dance, aft. ½ h. (H^2).

More gay and excited than usual, the 1st h. (H).

Looked lively and talked confidently (2).

Variable humour (xxii).

Exhilaration alternating with depression (xxvii).

70. Pulse and disposition altered with severity of symptoms; sometimes despaired of his life, sometimes thought he would recover, sometimes was quite rational, sometimes talked nonsense, sometimes wept, sometimes sang (3).

Apathy, indifference to all the world (iv).

Indifference to every thing (43, xvi).

Laziness (x, xii, xxiii).

Dislike to all sorts of work (xvi, xxix).

75. Disinclination to speak (xxvii).

Wishes to be alone (xxvii).

Mind.

Head- and face-ache much increased by mental exertion (I^a).

Confusion of mind (27, xxix).

Distraction of the attention when reading and writing by a frequent cessation of the thoughts (H^5).

80. Distraction (I^a).

Great distraction, weakened memory, with exalted mental tension (xiv).

Great distraction of thoughts, aggravated in room or when at rest, ameliorated in open air and when moving (xii).

Thoughts disturbed, the time since yesterday seemed to be far distant, must think for some minutes before he could remember what he had done (ix).

Thoughts distracted, what he resolves to do one minute he forgets the next (ix).

85. He is in a reverie, and sits buried in thought (H).

Unsteadiness of the ideas; if she wants to pursue one train of thought a second chases it away, a third again displaces this, and so on, until she becomes quite confused (H^2).

Thoughts very flighty (xxvii).

Weakness of memory, aft. 5 and 9 h. (H).

Memory much impaired (63, 70, ii, iv, vii).

90. Want of memory; he feels as if what he had just done were a dream, and he can scarcely recall what it was (H^2).

Flow of ideas sluggish, long reflection impossible, power of attention impaired (I^a).

Preoccupation of the mind; he is unable to complete his description of the thoughts he had conceived and half written down, without first making an effort to recall them, 3rd d. (H^6).

Attention impaired (iv).

Weakened power of thinking (H^6).

95. Indisposed to mental exertion (viii, xxii).

Inability to study (xi, xiii).

Could not write (50).

Felt as though mental operations took place in præcordium and about mouth of stomach, and not at all in head (4).

Speaks much and rapidly (12).

100. Mental and bodily agony extreme (48).

Strange fancies pursued him, gave away a sovereign for a shilling (63).

Lucid vision: he says, "now my beloved (70 miles away) must have sung the difficult passage that I was just singing" (H).

Semi-delirious (68).

Rambled occasionally (52).

105. Delirium (9, 51, 58, 66, 68, 69, 74).

Delirious, threw arms about wildly, talked of dancing and sang a great deal (64).

At night in delirium attempted to cut his throat with a razor (63).

Delirium, he whistled on a leaf (1).

Highly delirious, talking all sorts of nonsence, imagining strange figures, goblins, &c., about bed, but natural at times, mistook people, rambled incoherently (63).

110. Delirious, jumped about, could hardly be kept in bed (66).

He is delirious while awake, jumps out of bed and thinks he is driving sheep, aft. 14 h. (H).

In evening after lying down, and by day when sitting he has waking dreams, and has delusions as though he were far away from home (H).

Threw himself about violently, attempted to bite attendants (58).

Smoking caused stupefaction (xxii).

115. As if stupefied, evening (ii).

Stupor (11, 22½).

Lies in a stupefied state, cannot speak (9).

Could be roused by the slightest touch, but sank back when that was left off (65).

Coma (31, 45, 46).

120. Insensibility (32, 46, 75).

Unconsciousness (24, 35, 65, 71, 3ª).

Lost consciousness for a few seconds and then became sensible (35).

Loss of consciousness during convulsions (12).

Mental functions performed with unusual strength and duration (xxvii).

125. Lively memory (H).

SENSORIUM.

Vertigo (3, 7, 16, 18, 29, 32, 35, 56, 2ª, xii, xvii, xxv, xxix, iª, ivª).

Vertigo, aft. 2 h. (4).

Dizzy in head on waking, morning (H).

Giddiness relieved by drawing a long breath (29).

130. Vertigo; feeling of swaying to and fro in the brain (H).

Giddy, especially in open air (xxvii).

Vertigo when walking (vii, xxv).

Vertigo when walking and driving (ii).

Vertigo, esp. when stooping; she staggered to and fro, esp. towards r. side, aft. 36 h. (H^2).

135. Vertigo on stooping (xiii).

Vertigo on rising up (iv).

She could hardly get into bed for vertigo, in which all seemed to turn round in a circle with her, aft. 37 h. (H^2).

She has a whirling in the head so that she dare not move it, with a feeling as if the eyes would close (H^2).

Sudden vertigo after eating (ix).

140. Vertigo with anxiety (xxiii).

Vertigo and tinnitus aurium (vii).

Giddiness; felt as if his legs were going away from him (30).

Giddy, could not walk across room without help (iiiª).

Vertigo with staggering (xxvii).

145. Vertigo so as to make him fall (ix).

Vertigo very much increased on shaking head, when it became quite black before her eyes (H^2).

Vertigo and giddiness (H).

Giddy weight of head, esp. in forehead and on stooping,

with nausea, and qualmish feeling in scrob. cordis, aft. 2 h. (H^3).

Vertigo and headache, unaffected by active exercise, aft. ½ h. (H^3).

150. Vertigo and headache in sinciput and occiput, both worst when stooping, aft. 10 m. (H^3).

Unsteady gait, like a drunken person (27, 40, 51).

Staggering (14, 19, 40, 45, 50, 55, 64, 71, xi, xii).

Staggering as if from a violent blow on head (xi).

Fell down immediately (i^a), while urinating (xxix).

155. Confusion of head (23, i, iii, iv, vii, viii, ix, xi, xii, xvii, xxi, xxii, xxiii, xxv, xxvi, xxvii).

Confusion of the head, as after intoxication, with aching in temples (H).

Head confused, giddy, painful (iii).

Confusion in forehead (xix).

Confusion in r. side of forehead (xix).

160. Giddy confusion in r. side of forehead when walking in open air (v).

Confusion of head while eating (xxv).

Confusion of head with hot feeling (xxii).

Confusion of head after mental or bodily exertion (iv).

Heaviness and confusion of head (v, vii).

165. Stupid and dazed (70).

Head dazed, morning (vi).

Head dazed and empty, as in drunken somnolence (iv).

In the morning vacancy and emptiness of the head, as after severe intoxication (H^5).

Appeared drunk (68).

170. Feels as if tipsy (xi).

As if intoxicated; all goes round with her, she staggers when walking, as if she would fall, with nausea, not on sitting, worst on rising from a seat, less when walking, aft. ½ h. (H^2).

Head.

Heat in head (vi, xxii, xxv).

Head and face very warm (iv, i^a).

Head warm and feels small like that of a child, when supporting forehead in open hands hands (xxvii).

175. Burning in head as if skull were filled with boiling water (3).

Sudden congestion to head with anxiety (xxii, xxix).

Headache, full feeling (viii, i^a).

Compressed and distracted feeling in head (55).

Thought his head many times the ordinary size (47).

180. The brain seemed to be too large, and pressed firmly against skull (xii).

Benumbed feeling in head (55).

Heaviness of head (7, 29, 43, ix, xiii).

Head heavy and giddy as after drinking strong wine (xxiii).

Heaviness of head and vertiginous surging and swaying of head (xi).

185. Head dull and heavy (ii^a).

Oppression of head (10).

Pain in head (1, 17).

Headache (56, 63, 71, xiv).

Violent headache (vii).

190. Headache increased by bending forwards (vii).

Speaking increases the headache (H).

Pains running from head through all limbs (52).

Pressive pain in head (i, xxi).

Dull pain in interior of skull (iv).

195. Feeling as if something were drawn out of head, whereby her upper eyelids are drawn upwards, aft. ½ h. (H^2).

Stupid bruised pain in head, with bruised feeling in all the limbs, aft. 14 h. (H).

Headache, as if the brain pressed out (H).

Tightness in head (51).

All forenoon, pressive contractive headache spread all over over skull, esp. l. side and above l. eye, relieved by application of cool hand (xxvii).

200. Felt as if skull were tightly constricted externally with a band (4).

As if a hot iron were bound round head (12).

Head felt as if in a vice (29).

Head felt distracted as if from pressure of a vice (55).

Pressive pain in whole cranial vault as if equally compressed from all sides (xi).

205. Wedge-like pressing inwards headache, worse in room (xii).

Shooting headache (xxii).

Shooting pains through head (51).

Shooting pressive headache when coughing (xxiv).

Shooting throbbing headache, as if an ulcer were inside, which sometimes prevents speaking (H).

210. Throbbing in head (xxv).

A fine throbbing here and there in head (H.)

Headache, as if here and there a part of the brain were lifted up, increased by slight movement, even by drinking and speaking, aft. ½ h. (H).

Forehead.

Heaviness of head esp. in frontal region (xv, xxi).

Feeling of fulness and heaviness in forehead, as if an out-pressing weight lay there, and as if all would be forced out at forehead, aft. ¼ h. (H^2).

215. Frontal headache during fever (ii).

Pressive pain in sinciput (xxi).

Pressive pain in forehead (iii, viii).

Pressive pain in forehead for some days (ii).

Great confusion of head and pressive pain in forehead on waking (viii).

220. On stooping, her forehead feels very full, as if all would come out, aft. 25 h. (H^2).

Headache as if the eyes would fall out of head, aft. ½ h. (H.)

Pressive stupefying pain in forehead, worse about 6 p.m. (v).

Dull pain in frontal region (xv).

Stupid feeling of the head, as if he had a board before forehead, after ¼ h. (H^2).

225. The head in front is as if nailed up, in the warm room (H^2).

Feeling of contraction of brain under forehead, aft. 20 h. (H^2).

Contractive pain in forehead (H^1).

Tension all over forehead (H^4).

Out-pressing pain in forehead (H^6).

230. Sometimes a fine shooting,

sometimes throbbing, sometimes aching pain in forehead when walking, relieved by sitting (H).

Shooting by jerks in head, esp. forehead (H^2).

Pinching squeezing in forehead, as if in bones; she feels ill as if about to go mad, aft. 12, 24 h. (H).

Violent headache, chiefly in upper frontal region, pressing and contractive, increased by light and noise (xxvii).

Very painful, sharp, pressing headache above forehead (H^6).

235. Violent headache, esp. in r. half of forehead (xiii).

Headache; a throbbing in l. side of forehead, whilst strong beats occur in the r. side by fits, aft. 3 h. (H).

Squeezing in forehead, above root of nose, as if she would lose reason, aggravated by walking in open air, aft. 4 h. (H).

Squeezing, tensive headache, close behind orbits (H).

Shooting and somewhat aching pain above orbits towards superior maxilla, causing nausea, or as usually occurs during vomiting from an emetic, aft. 2 h. (H).

240. Aching shooting sick headache above orbits and down to upper jaw (H).

Throbbing in forehead towards eyes (xxv).

Pressive pain in r. eyebrow (i).

Shooting pain in r. upper orbital border, that spread in dendritic form upwards over forehead to hairy scalp, sideways to r. temple and down to cheek and 2 or 3 molars, increased by pressure, and becoming so violent towards evening it could hardly be borne (xiii).

Sudden, transient, violent compressive pain in r. upper orbital border (x).

245. Violent pain in l. eyebrow, as if the head were split with a wedge (xii).

On waking in morning violent pain in a small spot over l. eyebrow (xxvii).

Slight pressive pains in r. frontal protuberance spreading to upper orbital border (x).

Pain in forehead and temples (v).

Immediately after dinner obtuse stitches in brain in r. side of forehead, then in temporal region, lastly in occiput (xxvi).

250. Tingling on temples, with sense of enlargement of whole forehead (72).

Feeling of crepitation (like bending gold tinsel to and fro) in temples, nose, and forehead (H).

Forcing out in temples with fulness in forehead (v).

Acute pressive pain in both sides of vertex and forehead (xxiii).

Confusion of head, changing into heavy feeling and pressive pain in crown and forehead (iii).

255. Tensive pressure in head, first in crown, then in forehead, where it caused feeling of heaviness and fulness, lasting several hours, agg. by movement, forenoon (viii).

Heaviness in forehead and parietal bones (vi).

Pressive pain in forehead and occiput (xiv, xxii).

Pressing pain in head, sometimes more in occiput, sometimes at root of nose (xxii).

Temples.

Full feeling in temples (vi[a]).

260. Dull pain in temples (xiii).

Pain in temples and along course of supraorbital nerve (v[a]).

Headache with constriction at temples (v[a]).

Pressive pain in temples (xxv).

Shooting, beating pain in temples (H[2]).

265. Dull stupefying pain in temples, making thinking impossible and causing anxious feeling (xii).

Wedge-like bursting pain in temples (xii).

Contraction of temporal muscles (xxvii).

Drawing in temporal muscles (xxvii).

Throbbing in temples (vi[a]).

270. Throbbing in temporal arteries and feeling as if hair stood on end (xvi).

Violent pain in r. temple (ix).

Pressive pain in r. temple (xii).

Stitches in r. temporal muscle (xix).

Pressive pain in l. temple (v).

275. First a pressing then slight soreness in l. temple (v).

Stupefying, drawing in-pressing in l. temple (H[2]).

In l. temple shooting pain by jerks; stitches pass through temple into head (H[2]).

Tearing pain in l. temple (H[1]).

Tearing pain in l. temple, with roaring in ears (H[2]).

280. Dull pain in vertex extending to temples, increased by stooping (xxiii).

Aching pain in temporal region, afterwards also in jerks in occiput, lastly confusion of head and contractive pain (H[5]).

Crown.

Dull pain in vertex (xxiii).

Pressive pain in vertex (ix).

Headache in crown as from pressure of a great weight (ix).

285. Pressure and weight in crown (xxiii).

Tensive pressure in crown (viii).

Pressure and tension in vertex (xxiii).

Pressure and acute stitches in vertex (xxiii).

Headache in crown, felt as if he had a pitch cap on head which compressed it equally from all sides, went off on moving in open air (xxvii).

290. Pressure on crown, as if a cap were tightly pressed on (xxiii).

Pain in l. side of crown, agg. by stopping and moving head (xix).

A cool air rising from stomach over crown and occiput (3).

Parietals.

Sensation as if head were compressed by screws from both sides (xxvii).

Violent pressure in both parietal regions, disturbing sleep (ix).

295. Semilateral drawing in head (H[2]).

Heaviness and out-pressure in r. side of head (v).

Jerking, shooting, drawing, tearing pain in upper part of r. side of head (H[1]).

In l. side of head pain as if head were compressed (H[1]).

Occiput.

Pain in occiput (i).

300. Pressure in occiput (xxvii).
Stretching dull headache, esp. at occiput (16).
Twitching tearing pain in occiput (H^1).
Painful jerks in occiput (xxvii).
A shoot in occipital bone (H^4).
305. Drawing and numb sensation in l. occiput (v).

Base of Brain.

Acute agonising pain in nape and base of brain (48).

Movements of Head.

Head drawn backwards (7, 19, 28).

Post-mortem Appearances.

Head much thrown back (35).
Vessels of surface of brain turgid, little fluid in ventricles (50).
310. Cerebral vessels congested, fluid in ventricles increased (73).
Slight excess of fluid in ventricles (54).
Serum in ventricles (26, 34).
Serous effusion under meninges at base of brain (15).
Arachnoid slightly congested (54).
315. Vessels of brain and arachnoid congested (15).
Arachnoid dense and opaque, contained a large quantity of serum, pia mater gorged with fluid blood, bloody serum oozed out of sulci between convolutions, numerous bloody points in cut surface of brain (34).
All cerebral vessels highly injected (8, 9, 13).
Membranes of brain very hyperæmic, sinuses full of thin bright red blood, subarachnoid extravasation in hemispheres, grey substance hyperæmic (4^a).
Dura mater much adherent to skull, $\bar{3}$ss of clear serum in ventricles, sinuses filled with dark fluid blood, veins in floor of 4th ventricle much congested (58).
320. Much fluid blood in occipital region (34).
Brain studded with blackish points (13).

Scalp.

Feeling of coldness in scalp, which passed gradually into contraction of galea aponeurotica (xxvii).
Creeping in scalp (xxvii).
Scalp as if swollen and numb (xxvii).
325. Flying stitches under scalp (xvi).
Crawling as if from ants in head, esp. temporal region (xxvii).
Tensive formication and prickling in temples (vi^a).
Formication in crown (xxvii).
Creeping in l. side of head, as from a brush (H^4).
330. Painful spots on hairy scalp, sensitive to touch and cold air (xvi).
Towards evening she got very hot in whole head, followed by tenderness of whole head, esp. of forehead, lasting all evening, aft. 11 h. (H^2).
Sensitiveness of scalp, esp. in crown, on touching hair painful tickling (xix).
Head as if pressed together, as if the galea aponeurotica were too tight (xxvii).

Feeling as if some one drew him up by the hair (H^2).

335. Feeling as if hair stood on end in crown (xxiii).

Feels the roots of the hairs (xxvii).

SLEEP.

Sleeplessness, in 4th h. (H).

Sleepless (24, 63, iv, ix, xii, xiii, xvi, xvii).

Feel asleep with difficulty owing to great excitement (ii).

340. Disturbed sleep (xv, xxix, ii^a).

Night very restless, got out of bed several times and could not get in again without help (9).

Nights restless (ix, xxiv).

Sleep restless (2^a, i, ii, xiii, xv, xxii, xxv).

Light sleep, from 1 to 5 h. (H).

345. Sleep so light thought he had not slept (ii).

Frequent waking at night (ix, xxv, xxvi).

Starting from sleep in affright (xix).

He starts in affright, makes many movements, and speaks in sleep (H).

She starts up in sleep and says some one is seizing hold of her (H.)

350. At night sudden waking as from a frightful dream (xxii).

Sleep restless, broken, unrefreshing (ii).

Yawns often without being sleepy (H^2).

Yawning (43, iv, vi, x, xiii, xvi, xix, xxv, v^a).

Interrupted yawning, she cannot yawn perfectly (H).

355. Yawning and stretching (H^2, xvi).

Frequent stretching (xxvii).

Frequent yawning and drowsiness, noon (xix).

Sleepy (68, iv, ix, x, xxvii, iii^a, iv^a).

Great drowsiness, afternoon (xxii).

360. Sleepiness, sleep, aft. 2 h. (H).

Aft. eating unusual sleepiness (H^2).

Afternoon, great sleepiness, eyes close, but he easily wakes at a slight noise, but always falls asleep again (H^2).

Sleepy, dozed and woke up saying he had delightful dreams (50).

Sleepy but can be easily roused (52, 67).

365. Goes about half asleep (iv).

Irresistible drowsiness even when walking (ix).

Sleepiness and laziness; even when walking uncommon sleepiness (H^4).

Whilst standing on one foot or other, he slumbers when standing (xxvii).

Uncontrollable desire to lie down and sleep (44).

370. Languid and sleepy, could not hold head up or keep eyes open (iii^a).

Sleep in spite of slapping and ammonia (48).

Soporous state (9).

Stupefied sleep, confused dreams, can hardly waken properly (vi).

At night felt as though he slept in the air and had no support (ii).

375. Sleep dreamy and broken (iii^a).

Towards morning he has a very vivid dream which gives him a correct explanation of a circumstance that was an inexplicable riddle to him when awake, aft. 20 h. (H).

He dreams half the night about a single subject and is also occupied with it alone several hours after waking, so that nothing besides this subject possesses his mind—like the fixed idea of an insane person—which is very annoying to him and bothers him (H).

Vivid dreams of an agreeable character (xix).

Sleep broken, full of vivid dreams, distinctly remembered (xxiii).

380. Sleep full of dreams; confused, vivid dreams (H^2).

Confused dreams, (viii, xxiv, xxix).

Half-sleep at night with confused fantastic dreams (xii).

Anxious dreams (ix).

At night anxious dreams and frequent waking in affright (H^5).

385. Disturbing dreams (24, xiii, xv, xix).

Restless night with disturbing dreams (51, i).

She has vexatious dreams (H).

Long of falling asleep, sleep not sound, vexatious quarrelsome dreams (v).

Long dreams, with anxiety in chest that impeded breathing, so that he woke up in consequence—nightmare (H).

390. Dreams, during which he talked much (H).

Horrible dreams (48, v, xix).

Sleep disturbed by dreams of disreputable persons who assembled round her bed, especially an old lady who, starting out from behind the curtains with a large umbrella, assumed a threatening attitude causing her to awake with a scream (67).

Nights restless with vivid dreams of what happened during day (i).

Nights restless with dreams about his patients (i).

395. Restless night, broken by frightful dreams (ix).

Restless sleep after midnight and bad dreams (xiii).

Dreamt of things that had occurred long ago, which he had not thought of for years, so vividly that after waking they were still before his eyes (i).

Sleepless towards morning but very vivid phantasies prevented full consciousness (xiii).

He sleeps sitting with head bent forward (H).

400. He cannot lie on r. side nor on back; he turns about in bed with pains from one side to the other (H).

In the morning, he lies in sleep on back, the l. hand opened laid under occiput (H).

Slow respiration in sleep (H).

Inspiration with double jerk, like the butting of a goat, in sleep (H).

Eyes.

Pupils normal, but sluggish (43).

405. Pupils insensible (3^a).

Pupils insensible, not much dilated (45, 48).

Pupils contracted (10, 24, 51, 62, 67).

Pupils contracted, aft. 5 h. (31).

Pupils contracted, sluggish reaction (H, 3^a).

410. Pupils at first unusually mobile, finally very much dilated (iv, i^a).

Pupils dilated (11, 16, 21, 23, 26, 28, 30, 36, 42, 43, 44, 50, 52, 54, 55, 56, 58, 61, 64,

68, 70, 71, 72, 74, 3^a, iv, vii, ii^a, v^a, vi^a).

Dilated pupils, immediately (H).

Very widely dilated pupils (H^6).

Pupils at one time extremely dilated, at another only r. dilated, l. normal (66).

415. Pupils dilated for 3 d. (68).

Pupils dilated, r. nearly oval, l. irregularly polygonal (26).

Pupils dilated and insensible (23, 53).

Pupils dilated, sensitive to light (25, 63).

Eyes fixed and very brilliant and sparkling, pupils extremely dilated (50).

420. Congested eyes (3).

Conjunctiva injected (52, 53, 61, 63, 3^a).

Conjunctiva injected, its vessels enlarged, bulging and tortuous, of a bright pink colour (61).

Conj. of both eyes injected, esp. in internal canthus (xiv).

L. conjunctiva injected, with tortuous vessels (62).

425. Art. cent. retinæ distended, retina congested (61).

Watering of eyes (xxiv, xxix).

Constant lacrymation (24).

Felt as if eyes must drop from sockets (38).

Ophthalmia with lacrymation, the pain was so great he wished to die (i).

430. Very painful inflammation of eyes, chemosis (H).

Eyes half closed (45).

Eyes closed (9, 24, 43, 2^a).

The eyes are closed with a jerk, as in irresistible sleepiness (H^2).

Eyes bright (63).

435. Eyes sparkling (iii, xiii).

Eyes expressionless (45).

Eyes staring (7, 10, 26, 64).

His eyes are staring, immediately (H).

Eyes fixed on vacancy (74).

440. Eyes glassy (55, 74).

Very mobile eyes (12).

Eyes restless (63).

Eyes turned upwards (19).

Slight distortion of eyes (xvii).

445. Eyes distorted (2, 14).

Convulsions of eyes and mouth (3).

Eyes felt strained (VI^a).

Eyeballs felt enlarged as if protruding from orbits or stretching lids (xxvii).

Sensation in eyes as if they were greatly swollen, aft. 5 h. (H^2).

450. Peculiar feeling in eyes, like that felt by amaurotics in first stage, a warmth and undulation in eyes, with involuntary half closure of lids (i).

Great sensitiveness of eyes (xxv).

Great sensitiveness of eyes to air, not to light (xxvii).

The eyes feel cold in open air (H).

Eyes felt sore as if had cold in head (61).

455. Prickling smarting in eyelids, like commencing catarrh (v).

Pain in eyes and photophobia (61).

Slight burning in eyes (xvi, xxiv).

Burning in eyes, all day (ii).

Burning alternately in either eye (xxiv).

460. Itching and burning in eyes and lids, causing him to rub them (xxvii).

Burning soreness in eyes (61).

Aching and burning in l. eye, and over eyebrows (H^4).

Aching in the eyes, most

observable when looking down and when moving eyes to and fro, at the same time with heat in them (H^5).

Upper half of eyeballs sensitive, esp. when moving eyes, as if they were pressed in from forehead, relieved by stooping (xxiii).

465. Sensation as if whole eyeball were pressed into orbit, so that the eye pained as if contused (v).

On opening eyelids, pain in interior of eye (as if it would be pressed out), which spread over region of eyebrow into interior of brain, aft. 21 h. (H^2).

Pressure in l. eyeball as from a heavy weight (xi).

Tensive pressure in l. eyeball (v).

Pressure in l. eyeball and r. orbital region (v).

470. Pressure and shooting in anterior, not superficial parts of eyeball (i).

Distressing tightness across nose and eyes (55).

Twitching of eyelids (71).

Eyelids swollen (53).

L. eyelid much swollen (61).

475. Hard, red swelling of r. upper lid, with tensive sensation, esp. in morning (H^3).

Dryness of upper lids, causing a sort of aching in eyes, aft. 5 h. (H).

Heaviness of lids; they seem too heavy on raising them (H^2).

Pressure in both upper lids alternately (v).

Soreness and itching in tarsal edges (v, xxix).

480. Pain in r. orbit (xi).

Pain in l. orbit went off aft. dinner (xi).

Pressive tearing in l. orbit like constriction, as if the eyeball would be pressed out (xi).

Tearing in orbital border (xi).

P. m. Pupils dilated (26).

Vision.

485. Acute vision (H).

Sensitiveness to light (vii).

Cannot look at a highly illuminated object without blinking (iv).

Eyes dazzled (12).

Photophobia (61).

490. Photophobia aft. 6 and 12 h. (H).

Desire for light, longing to look into the bright light, aft. 3 h. (H).

Near and distant objects seem to swim (iv).

Swimming before eyes (29).

Flickering before eyes (iv, xxvii).

495. When passing from obscure room into street, flickering before eyes, the lamp light trembled and swayed, difficulty of seeing passers by (xxiii).

Disturbance of vision (72).

Saw near objects worse, distant objects better than usual (xxiii).

Though the room was quite light, felt as though he could not read for want of light (i).

Dimness of vision (22½, 30, 70, 73, iv, vii, xxviii, vi^a).

500. Vertiginous obscuration of vision (6).

Vision greatly impaired, could not read ordinary print (61).

Said the faces of her friends had no colour, but were livid and transparent (67).

Vision hazy (iii^a).

Misty before eyes, she does not see distinctly, with giddy feeling (H^2).

505. Mist before eyes (7, xiii, xxvii).

Veil before eyes (xxvii).

Vision imperfect, blackness coming over sight (55).

Room seem quite dark (56).

Partial loss of sight (41, 51).

510. Sight almost gone (22, 67).

Transient loss of sight (50).

Lost sight theee times (3).

On rising from recumbent position unable to see for a minute (iv^a).

Said "all is dark, I cannot see at all" (65).

515. Quite blind, aft. 2½ h., vision returned aft. 5 h. (19).

Blindness (38, 48, 2^a).

Black spots hovering before sight (H).

Vision of sparks (xiii, xvi).

Diplopia (68).

520. Hallucinations of vision (33).

Hallucination of vision, objects in the light seem to grow bigger and bigger (63).

After bleeding said she felt as if she came out of a narrow, hot, dark room into a well lighted one (10).

Sight impaired after vomiting (10).

Sight returned after fits of vomiting (48).

Ears.

525. L. ear hot, r. cool (61).

Formication spreads from l. side of face to ear as if something lay before it, the pain seems to be in bone around auricle (v).

Tickling sensation in r. ear as if a small worm crept in (H^1).

Burning, shooting, and itching in both ears (xxiii).

Sense of pressure in ears (i^a).

530. In forenoon, frequent fine stitches and stoppage in l. ear, as in catarrh (v).

Acute stitches in r. external meatus auditorius (xxvi).

Drawing, shooting pain in ear (xii, xxx).

Tearing in l. ear (H^4).

Drawing from temporal muscles to external meatus with feeling of tension there (xxvii).

535. Aching in r. Eustachian tube when swallowing (v).

Pain behind l. ear like pressure with thumb (H^4).

Hearing.

Noise is intolerable (vi).

As if something lay before ear (v).

Feels as if something lay before l. ear (H^1).

540. Deafness (3^a).

Dizzy and deaf (2^a).

Loud noises in ears likened to hundreds of omnibuses rolling past on every side (44).

Roaring in ears (iv, vii, xi, ii^a).

Constant humming and hissing in ears till swooning came on (7).

545. Roaring in ears with sensitiveness to every noise (xvi).

Roaring in l. ear, recurring four times, afternoon (xix).

Ringing in ears aft. 10 m. (H^2).

Tinnitus aurium (xxii, i^a, vi^a).

Tinnitus aurium and vertigo (vii, xiii).

550. Tinnitus aurium when walking (vii, xiii).

Nose.

Painful furuncle on tip of nose (xix).

Pressure on root of nose xxvii).

Sensation of stupefying compression of root of nose (H^2).

Distressing tightness across nose and eyes (55).

555. Nose felt sore as if had cold in head (61).

Alæ nasi dilated (70).

Frothy mucus from nostrils (57).

Blowing of blood from nose (i).

Epistaxis (H).

560. Epistaxis of bright red blood (i).

Extreme sensitiveness of olfactory nerves; disagreeable smells have a great effect on her (H).

Face.

Expression changed, look extinguished (9).

Countenance Hippocratic (19, 36, 3^a).

Anxious expression (53, 58, 63, 67).

565. Distressed and anxious expression (74).

Face pinched, anxious expression (42).

Expression of agony (34).

Features pinched, dark ring round eyes (51).

Expression of fright (19).

570. Stupid expression (27).

Depressed, heavy expression (40).

Forehead wrinkled between eyebrows (42).

Facial muscles twitch (9, 24, 30, 47, 2^a).

Sensation of distortion of features (iv).

575. Features distorted to one side or other (54).

Features spasmodically distorted, esp. about mouth (3^a).

Distortion of features (vii).

Violently convulsed in face (48).

Tonic spasms in face (3^a).

580. Face pale (50, 54, 55, 56, 1^a, i).

Face pale, expression anxious, aft. 5 h. (12).

Face pale and fallen in (xxvii).

Face pale, expression miserable (48).

Great pallor of face with expression of great suffering (71).

585. Face very pale, features altered, blue rings round eyes (16).

Face pale and bloodless (21, 44).

Extreme pallor (47).

Face pale after siesta (vi).

Face dusky (58, 72).

590. Livid complexion (19, 40, 43).

Complexion cadaverous (2^a).

Face blue (2, 3, 65, xxvii).

Face blue and distorted (10).

Chin and jaw blue (74).

595. Cold feeling of face, which is hot to touch (xii).

Face flushed (52, 68).

Cheeks flushed (71).

Face flushed over cheek bones, otherwise pallid (59).

Face turgescent (3^a).

600. Face turgid, red (iii).

Complexion very red, face hot (xiii, xix).

Face very warm (iv).

Heat of face (viii, xxiv, i^a).

Heat of face, with red cheeks (v, vi, xxx).

605. Glowing cheeks (xxv).

Hot cheeks, evening (ii).

Flushes of heat in face and ears (x).

Forehead, face, ears, and neck hot to touch, r. side cool (61).

Face hot, hands and feet cold (iii).

610. Erysipelas of face where linim. was applied, parts swollen and bright red (62).

Sensibility of cheeks diminished (v^a).

No feeling in face (42).

Numbness of cheeks (65).

Numbness of face (53, 55).

615. Benumbed tingling in face (55).

Numb sensation spreading from teeth over cheek bones to external canthus of eye, and then all over body (xii).

Formication in face (iv, vii).

Tingling in face (iii^a).

Formication in r. cheek (v).

620. Tensive formication and prickling in cheeks (vi^a).

Creeping in face (v^a).

Creeping pain in cheeks (H).

Crawling sensation in face, feeling as if epidermis were scaling off (ii^a).

Full feeling in cheeks (vi^a).

625. Face felt swollen (10, 22½, 24, vi).

Feeling as if forehead and face swelled, esp. l. side (v).

Face felt swollen to double its size (7).

L. cheek feels swollen and hot, but is cool to touch (v).

Face feels swollen and tense (v^a).

630. Feeling of swelling of l. cheek (v).

Face puffy (8, 14).

Face puffy and pale (xxvii).

Puffy face and forehead (H).

Supraorbital region swollen, a dull shooting felt on pressure (xiii).

635. Face covered with cold sweat (19).

Forehead covered with sweat (55).

Cold sweat on forehead (2).

Cold clammy sweat on face and forehead (57).

Perspiration on cheek on which she lies (H).

640. Violent faceache (vii).

Pain in head and face (ii^a).

Tensive drawing sensation in course of trigeminus, which gave place to a shooting wandering pain, often interrupted, but afterwards continued (iv).

Drawing pressing sensation in cheeks, upper jaws, and forehead, increasing gradually in intensity, alternating with actual pain, at first transient, finally steady and severe (i^a).

Pain in zygomatic process, as from an internal ulcer there (H).

645. Pain in maxillary joint behind zygomatic process when chewing (H).

Pain in jaws (1).

Fine shooting and drawing in l. upper and lower maxilla (v).

Acute pressive pain in lower jaw (xxiii).

Pressure and digging in chin (v).

650. A very severe pain in jaw, as if it would fall off (3).

During the perspiration a burning pain shot several times into ear and upper maxilla (H).

Shooting jerks in lower jaw (H).

Lower jaw felt dead (70).

When formication went off, scaling off of epidermis in face (vii).

Lips.

655. Perspiration on upper lip under nose (H).

Itching pimples on upper lip (H).

Frothy saliva between lips (10).

Lips dry (61).

Lips dry and fissured (2ª).
660. Lips pale (53).
Lips dusky (72).
Lips blue (30).
Black lips (3).
Formication in lips (vii).
665. Numbness of lips (66, vª).
Numbness and tingling of of lips (61).
Tingling of lips (29, 53, 61, 70, iv).
Tingling of lower lip lasted 6 d. (55).
Burning and tingling of lips (52).
670. Burning and numbness of lips (17).
Burning heat in lips (67, iiª, vª).
Burning of lips with feeling as if they were swollen (xix).
Biting burning in lips (iª).
Burning from lips to fauces (xvi).
675. Burning on upper lip as from pepper (xxvi).
Pepper-like smarting on lips (xi).
Violent shooting pain from lips to stomach (iv).

Mouth.

Buccal m.m. red, studded with small, whitish-yellow vesicles, surrounded by bright red areola (iv).
Twitching of mouth (71, iv).
680. M. drawn to one side (2).
Convulsion of eyes and mouth (3).
Jaw stiff (10, 64).
Could not open mouth (2ª).
Involuntary pressing of lower against upper jaw with salivation (xxvii).
685. Teeth spasmodically closed 7, 10).
Mouth had to be forcibly opened (7).
Trismus (9, 14, 22, 26, 39, 69, 3ª).
Trismus in fits (69).
Constriction of mouth and fauces (2ª).
690. Jaw dropped, had to get it tied up (38).
Tingling in mouth (29, 55, 63, 64, 70, iiiª).
Benumbed tingling in mouth (55).
Tingling and burning in mouth (72).
Numbness in mouth (10).
695. Numbness about jaws (40).
Warmth in mouth relieved by drawing in air (xvi).
Burning and numbness of mouth (17).
Burning in mouth (27, 52, 67, 2ª, ix, xvi).
Burning of whole buccal m.m. (vª).
700. After supper, burning all over m.m. of mouth (iiª).
Pricking in mouth (22).
M.m. of mouth injected (xvi).
Feeling of soreness of orifices of salivary glands, as if excoriated (H).
Dryness in mouth (iii, xxiii).
705. Dryness of interior of mouth, immediately (H).
Feeling of dryness in fore part of mouth (H).
Coolness and dryness of mouth, without thirst (H⁴).
Mouth dry and burning (72).
Dry feeling first of lips, then of interior of mouth, with heat rising up from chest towards head, without redness of cheeks (H).
710. Frothing at mouth (22, 22½, 57, 73).
Mouth and beard wet with frothy saliva (52).

Salivation (22½, 40, ii, iv, v, vii, xii, xx, xxiii, xxvii, v[a]).

Spitting large quantities of frothy saliva (58).

Flow of frothy saliva into mouth (xxiii).

715. Great flow of saliva, immediately (4).

Suddenly sweet taste in mouth, spits a little bright red blood (xxv).

Fetid breath (H).

Feels as if breath were fetid on waking, morning (H).

Teeth.

Teeth chattered (70).

720. Teeth feel loose (70).

Teeth seemed to have fallen out (7, 24).

Pain in gums (67).

Drawing, burning pain in border of r. lower alveoli (v).

Teeth sensitive to air (xxvii).

725. Teeth sensitive when biting (2).

Peculiar sensation at roots of teeth (71).

Aching toothache in l. upper jaw (H[6]).

Shooting pain in various teeth, aft. 36 h. (H[6]).

Shooting and drawing in r. molars (v).

Tongue.

730. Lingual and buccal m. m. red, studded with small whitish-yellow vesicles surrounded by bright red areola (iv).

Three burning vesicles on tip of t. (xxv).

Feeling in root of t. as if it were spasmodically drawn down at both sides (xix).

Constantly moving tongue inside of mouth, thrusting it out and moving it from side to side (24).

T. protruding (75).

735. T. projected to affected side (61).

Tongue stiff (2[a]).

Could not move tongue (33).

Transient paralysis of t. (H.)

T. pale and contracted (55).

740. T. whitish (19).

White furred tongue (xv).

Yellow fur on tongue (xiv).

T. felt too large (29).

T. large, thick, tremulous (63).

745. Tongue like leather (ii).

T. dry, slightly coated (51).

On middle of t., sensation of dryness and roughness, without thirst, aft. 1 h. (H).

T. moist, slightly furred (iii).

Cold tongue (12).

750. Formication in t. (vii).

Peculiar formicating sensation in tongue as from peppermint (iv).

Numbness in t. (10, 24, 36, 65, 66).

Numbness at tip of tongue, extending to base with sensation of swelling (38).

Numbness and tingling of t. (45, 52, xxix).

755. Tingling of tongue (53, 70, (xvii).

Tingling heat in t. and also in jaws (7).

Burning in t. (59, i, xvi, xx, xxvi, xxix).

Burning in tip of t. (v, xix, ii[a], v[a]).

Burning in tongue with increased saliva (xii, xx).

760. Intense burning along t. (30).

Burning in both sides of t. as from aphthæ (ii).

Burning and transient stitches in t. (xx).

Burning and visible swelling

of tongue, with feeling as if cold air passed over it (xii).

Cooling burning in tongue, as from pepper or saltpetre (v).

765. Pepper taste spreading from root all over tongue, with increased saliva (xii).

Smarting sensation in tongue, chiefly towards its tip (H^2).

Biting in t. (22).

Biting burning sensation in lips and tongue (i^a).

Prickling in tongue (xx).

770. Prickling sensation at back of t., as from pepper, with flow of saliva (H).

Prickling and burning in tongue, as from pepper (xii).

Penetrating fine stitches in tip of t. (H_2, xxix).

P. m. M. m. of t. redder than normal at base (54).

Throat.

Frequently raised hand to throat (17, 18).

775. Rubbing throat (28).

Tightness in throat below larynx, said his throat wanted cutting (63).

Sensation as if throat were constricted (xix).

Constriction of throat (10).

Constriction in fauces (2^a).

780. Contractive sensation in back of throat, as from something astringent (H).

Constriction and burning sensation from mouth to stomach (2^a).

Choking sensation (51, 59, 60).

Paroxysms of choking (51).

He is apt to choke on swallowing saliva (H^3).

785. Choking prickly sensation (63).

Heat and constriction in throat, immediately (19).

Swallowing painful (xxiii, xxiv).

Difficulty of swallowing (24, 36, 51, 2^a, xxii).

Difficulty of swallowing and pain in back of neck and behind jaws in parotid region, so that in eating had to press the back of neck with hand (iii^a).

790. Great difficulty of swallowing fluid, which run out of his mouth (58).

Swallowing impossible (23, 30, 56, 57).

Feeling as of something sticking in fauces, causing frequent swallowing (xix).

As if an angular many-pointed body stuck in throat (xxiii).

Pain and uneasiness in upper part of throat (74).

795. On attempting to swallow any liquid a painful spasm of throat occurred, like that in hydrophobia; it was not produced by the sight of water, but by touching him sharply (1^a).

Dry throat (56, 73, xii, xiv, ii^a).

Dryness in mouth and gullet (xxiii).

Dryness in mouth and fauces at night, compelling him to drink (v).

Dryness and feeling of constriction in fauces (36).

800. Fauces dry and burning (72).

Dryness in palate and posterior nares (xxvi).

Dryness in soft palate and constriction in gullet, not going off on drinking cold water (ii).

Dry feeling in fauces, with much thirst, and feeling as if the water did not moisten the surfaces it passed over (ii).

Dryness and scraping in œsophagus (xv).

805. Dry feeling and scraping in

fauces, compelling frequent hawking with expectoration of tenacious mucus (xix).

Roughness of throat, esp. in posterior nares, compelling frequent hawking with feeling as if viscid mucus were drawn through choanæ and tiresome dryness (xvi).

Disgusting burnt taste in fauces, causing hawking of viscid mucus, sensation as if viscid mucus were hanging from uvula, causing inclination to vomit (xii).

Creeping in fauces (H).

Numbness of throat (66).

810. Tingling in palate (xvii).

Tingling in throat (63, 64, iv).

Tingling hot feeling in throat (63).

Tingling and burning in fauces (72).

Pain in throat (1).

815. Sorethroat with frequent swallowing of saliva (xxiv).

Sorethroat, more on l. side (xxiv).

Pain in fauces (19).

Pain in œsophagus (23).

Heat in œsophagus (xxiv).

820. Heat and burning in throat (27).

Burning feeling in throat (8, 12, 13, 22, 27, 52, xxix, v^a).

Burning in throat (59).

Feeling of acridity and burning in throat (v^a).

Burning in fauces (30, v, xxix).

825. Burning down œsophagus (19, 22½, 25).

Burning feeling in gullet, as if a hot coal were there (iii^a).

Burning pain from stomach through whole œsophagus to mouth, leaving a feeling of dryness (xxii).

Burning and numbness of throat, extending to stomach (17).

Burning from mouth to stomach (xvi).

830. Bitter and burning anguish in throat (2^a).

Burning and dry feeling in soft palate and fauces immediately, causing empty deglutition (ii).

Prickling boring in palate, throat, and along Eustachian tube (xxiii).

Cooling burning in fauces (v).

Burning and pricking in fauces (H).

835. Burning and scraping in soft palate, gradually spreading to hard palate and tip of tongue; soft palate red (xix).

Scraping and burning in back part of palate (xxv).

Scraping and itching in soft palate, compelling frequent hawking and spitting (xxvii).

Scraping and contraction in uvula and soft palate, compelling frequent hawking and spitting, with occasional inclination to vomit (xxvii).

Scraping in throat (v, vii, ix, xix, xxii, xxiii, xxv, xxix).

840. Scraping in throat, going off on hawking up mucus (xxvi).

Scraping in palate and throat (xxv).

In the throat a scraping, with difficult deglutition (H^2)

Scraping in fauces (xi, xxx).

Scraping and burning in œsophagus (xiv).

845. Scraping and burning in throat, as from cayenne pepper (xvi).

Scraping and constriction in throat, as if it were narrowed (xxiii).

Scraping in throat with redness of soft palate (xix).

Scraping swollen feeling and stitches darting through throat (xxiii).

Sense of compression in œsophagus (xxiii).

850. Pressure in fauces (v).

Pressure and tension in soft palate and fauces, as from swelling of those parts (xxvii).

Drawing from the side of throat to behind ear (H^2).

Pricking sensation at back of throat, as from the prickly hairs of the dog-hip, aft. 1 h. (H).

Repeated stitches in throat (xxiii).

855. On l. side of throat on a small spot, a shooting choking, when not, but esp. when swallowing and speaking. Aft. ¼ h. it passed to r. side, whilst the painful sensation in l. side disappeared, it remained there ¼ h., and then went off entirely (H^2).

Shooting and swollen feeling in throat (xxiii).

Feeling as if throat swelled, and as if a large quantity of mucus were there, which he could not get rid of by constant hawking (xxiii).

Uvula swollen and elongated (xxiii).

Uvula much swollen and with arch of fauces and posterior part of palate injected in an arborescent manner (xxiii).

860. On walking great pain in throat, uvula and soft palate swollen (xxiv).

Swelling of tonsils (xv).

M. m. of soft palate puckered (xxv).

Gradual injection of palate and tonsils (xi).

Whole pharynx reddened (xxii).

865. Pain, redness, and dryness of throat (xxiv).

Uvula and r. tonsil much injected (xi).

Both tonsils and uvula very red, scraping in throat (xi).

Soft palate, tonsils, and posterior surface of fauces reddened, with warmth from lips (which quickly become dry) down œsophagus (xvi).

Post-mortem appearances.

Gullet red and inflamed (8).

870. M. m. of pharynx redder than usual (26).

Œsophagus injected, tinged violet, the colour extending to pharynx and fauces (35).

M. m. of upper part of œsophagus redder, but reddest at lower end, longitudinal rugæ more marked than normal, solitary glands large and projecting (54).

Taste.

Taste flat (iv).

Sweet taste in mouth, relieved by hawking up mucus (xxii).

875. Sourish taste, with loss of appetite (H^2).

Bitter taste (H, ix, i^a).

Astringent taste (xii).

Peculiar sharp taste (iv).

Pepper taste (3, 12, v, ix).

880. At noon nauseous taste at root of tongue, going off when eating (v).

Nasty, fishy taste, as from stagnant, putrid water (H).

She felt as if the whole mouth filled with air of the taste of rotten eggs (H^2).

What formerly had a good and strong taste is now tasteless to him (H^2).

Taste gone (iv).

885. Taste entirely gone, did not

know whether tea was hot or cold (2^a).

APPETITE.

Anorexia (9, xiv, xv, xvi, xxi, xxix, v^a).

Anorexia, noon (ii, vi).

She will not eat anything (H).

No appetite, great thirst (iii).

890. Long-continued disgust and anorexia (H).

Dislike to wheaten bread (ii).

Soup and meat cause loathing (xvi).

Hunger, evening (ii).

Great hunger, renewed after eating (viii).

895. Thirst (63, v, ix, xxiii).

Intense thirst (34, 51, 56, 68, ii, iii, xxiv).

Much thirst at night (ix).

Thirst for cold water (3).

Thirst for beer, but when she has drunk it, it oppresses her stomach (H).

900. After eating, chilly feeling, exhaustion, drowsiness (xxiii).

STOMACH.

Warmth in stomach (71, xxvii, i^a, v^a, vi^a).

Hot feeling in pit of stomach (xxii).

Heat at epigastrium (72).

Emptiness in stomach with frequent eructation of air (xxv).

905. Feeling as if stomach were alternately distended and fallen in (ix).

Distension of stomach which is sensitive to touch (ix).

Tensive feeling in pit of stomach, relieved by eructation (xii).

Uneasiness at epigastrium (73).

Discomfort, as from deranged stomach (vi).

910. Disagreeable feeling in stomach (xxvii).

A dreadful sensation at pit of stomach, not pain (48).

Felt as if something collected in stomach (1).

Sensation as if a ball lay at pit of stomach that rose upwards and spread a cool air over crown and occiput (3).

Very violent heartburn (xvi, xxix).

915. Heartburn after eating (xxvii).

On waking in morning very violent heartburn almost preventing respiration, better after rising (xxvii).

After dinner heartburn with sore feeling in stomach (xxvii).

Hot burning in stomach up through œsophagus (xii).

Sensitiveness and warm feeling in stomach (xxii).

920. S. tender on pressure (51).

Tenderness at pit of s. (22, 22½).

Pain in stomach (1, 8, 20, 23, 31, 52, 63).

Cardialgia (6, 9).

Pains in epigastrium (52).

925. Pain and uneasiness at pit of stomach, aft. 10 m. (74).

Burning in s. (22½, 25, 51, 52, 53, 56, 59, 2^a).

Agonising burning pain in epigastrium (34).

Contractive sensation in stomach as from an astringent (H).

Sensation of violent constriction in hypochondria (H).

930. Feeling of weight in s. (xxiii).

Pressure in s. (ii, v, viii).

Anxious pressure in s. (xxii).

Pressive pain in scrob. cordis (iii, xv, xix).

Great pressure in s. as from something indigestible (xxii).

935. Pressive pain in stomach like a weight, after 1½ h. (H).

Pressive pain like a weight in hypochondria, aft. 1½ h. (H).

Tensive pressive pain, as from fulness or a weight pressing in stomach and hypochondria, aft. 1½ h. (H).

Pressure and coldness of stomach as of a stone lay there (1).

After eating, discomfort and pressive feeling in scrob. cordis and upper abdomen (ii).

940. In scrob. cordis pressure as if a stone lay there, which afterwards extended to back, with a squeezing-together sensation, as if she had injured herself by a strain; as if stiff (H^2).

Pressure in stomach alternating with splashing in bowels, followed by urging to stool (xxii).

Aching pain in stomach (H^4).

Aching pain in scrob. cordis when sitting, walking, and standing (H^1).

Aching pain in scrob. cordis which increased to tightness of chest, aft. 2½ h. (H).

945. Pain in scrob. cordis, as if it were swollen internally, with anorexia and attacks of dyspnœa (H).

Scraping from scrobiculus cordis up into throat, with nausea and qualmishness in the scrob. cordis, as if water would come up into mouth (H^2).

Violent pain in stomach and bowels, as if a big needle were passing through them (63).

Shooting and tension in gastric region for several hours, like flatulent colic after a full meal (xii).

Violent shooting pains from lips to stomach (iv).

950. Hiccup aft. eating and drinking (H).

Ineffectual effort to eructate; he wishes to eructate but cannot (H).

Eructations (vii, xv, xxiii, i^a, ii^a, v^a, vi^a).

Violent eructation (iv).

Severe eructation, loathing, inclination to vomit (iv).

955. Violent eructation, inclination to vomit, spasmodic contraction of stomach (vii).

Empty eructation (H^2, v, vi, ix, xii, xvi, xxv).

Eructation of air and nausea, going off aft. breakfast (v).

Frequent empty eructation with sourish taste, aft. 1 h. (ii).

Ill-smelling eructation (xii).

960. Frequent risings from scrob. cordis (ii).

Felt as if hot fluid rose into mouth (xii).

Sweetish water rose up, like water-brash; at the same time roaring in ears (H^2).

Belching up of sweetish water, with nausea (H^2).

Faint qualmishness (x).

965. Qualmish, sinking in scrob. cordis, worse when sitting, going off almost when walking, immediately (H^2).

Disgust and sinking, qualmish feeling, aft. ¼ h. (H).

Loathing (xv, xxx).

Loathing, nausea (iii, xxiv).

Nausea (9, 19, 23, 49, 66, 71, 72, 2^a, ii, xxii, iv^a, v^a).

970. Nausea and inclination to vomit (xxvii).

Nausea and gnawing pain in s. (25).

Nausea in erect position (iii^a).

Nausea, precordial uneasiness, rubbed stomach (67).

Deadly sick (44).

975. Deadly sickness, faintness, and pain in s. (34).

Loathing and inclination to vomit (xxvii).

Inclination to vomit (8, 15, xxvii).

Inclination to vomit at supper (xvii).

Inclination to vomit, as if he had eaten something disgustingly sweet or greasy, aft. 1 h. (H).

980. Inclination to vomit, at first in scrob. cordis, then beneath stomach, lastly in throat, without flow of saliva (H).

Inclination to vomit on walking in open air (H).

Violent inclination to vomit, relieved by eating (i).

Retching (31, 34, 58).

Constant dry retching (44).

985. Retching and vomiting immediately (50, 53).

Vomiting and retching (71, 74).

Vomiting (1, 7, 8, 9, 10, 11, 12, 13, 22, 22½, 27, 28, 31, 33, 35, 44, 52, 53, 64, 68, 71, 74, 3^a, iv).

Vomiting without relief (39).

Vomiting with relief (40, 2^a, 3^a, iv).

990. Vomiting with perfect restoration of consciousness (48).

Vomiting immediately (58, 1^a).

Vomiting aft. 8 m. (19).

Vomiting aft. ¼ h. (32, 52).

Vomiting aft. 1 h. (3).

995. Sickness and vomiting aft. a few m. (21).

Vomiting and eructation (55).

Vomiting with anxiety (1).

Vomiting and woke as if from profound sleep (48).

Violent constant vomiting (17).

1000. Severe and persistent vomiting for 6 h. (55).

Vomiting and purging (37).

Patient seized with a general spasm, during which turned convulsively on abdomen, and with intense action of abdominal muscles, jerked out contents of stomach with a loud shout, caused apparently by sudden contraction of diaphragm; these paroxysms occurred every 1 or 2 m. (1^a).

Vomited first frothy matter, then viscid mucus, then frothy mucus tinged with blood, and subsequently bile (74).

Vomiting of slimy stuff (12, 23, 24).

1005. Vomiting of a fluid like gravy soup and mucus (34).

Vomiting of greenish-grey watery fluid (xxii).

Bilious vomiting (10).

Vomiting of green bile (3, 16).

Vomited fetid, black, bilious matters (2).

Post-mortem appearances.

1010. Stomach studded with black gangrenous spots (9).

Stomach congested (13).

M. m. of stomach at fundus and large curvature irregularly reddened (15).

Small intestines studded with red spots (15).

Brownish-black patches in inside of s. (22).

1015. Some patches of congestion along large curvature (26).

M. m. of s. congested in patches of various sizes of dark red colour (30).

M. m. of s. deep chocolate colour throughout, most about cardiac orifice and gr. curvature, many bloody points in patches here and there (32).

Stomach red and inflamed (8).

M. m. of stomach strongly hyperæmic and brightened from intense vascular injection (4^a).

1020. M. m. of stomach showed a reddish-brown patch at cardiac extremity, elsewhere normal (34).

Stomach congested, bright scarlet, rugæ less distinct, the bright colour extended past pylorus into duodenum, gradually becoming duller and ceasing in jejunum (35).

Capillary congestion of large end of stomach, which was bright red, marks of irritation and softening and separation of part of m. m., which was all highly congested (50).

M. m. of s. intensely congested, most so at greater curvature where it was like capillary extravasation (54).

M. m. of stomach deep red and slightly granular, lined with tenacious white mucus (73).

ABDOMEN.

1025. Qualmish feeling in abdomen (viii).

Weakness of bowels such as is apt to occur from abuse of purgatives (H).

Contraction of muscles of abdomen and thorax, causing her to spring up in bed (70).

Contraction of abdominal muscles (vii).

Violent drawing pain in recti abdominis muscles, which were stretched as hard as a board (xiv).

1030. Pressing pain in r. abdominal parietes as from flatulence (xii).

Pressing pain in l. abdominal parietes (xii).

Abdomen distended (8, 9, 15, xv, xvii, xix, xxvii).

Abdomen distended with flatulence, and tender (xix).

Great distension of sensitive abdomen (xxvii).

1035. Abdomen distended, as if dropsical (1, 3).

Tympanites (39).

Under the ribs, tense, painful and hard (1).

Rumbling in bowels (iv, xxv, xxix, i^a, ii^a).

A sort of fermenting rumbling in abdomen (H).

1040. Rolling and rumbling in abdomen, with feeling of rawness (H).

Rolling and rumbling in abdomen all night (H).

Painful rumbling in bowels and discharge of flatus with relief (x).

Rumbling and shooting contractive pain here and there in bowels (xxvii).

On waking in morning loud rumbling and grumbling in bowels, relieved by discharge of flatus (xxvii).

1045. Pain in abdomen, great development of flatulence and rumbling in bowels (xv).

Flatulent sufferings (xix).

Pain in belly, as from flatulence (xxii).

Loud gurgling and splashing in bowels (xxii).

B. tender on pressure (51).

1050. Abdomen sensitive to touch as if peritoneum were slightly inflamed (xxii).

The hypogastrium is painfully sensitive to touch (H).

Pain in belly (8, 14).

Pain round waist (39).

Slight pains in upper abdomen when walking (v).

1055. Slight griping in belly, noon (xii).

Griping and increased warmth of abdomen (xiv).

Griping in upper abdomen with distension (v).

Griping round navel (xv).

Violent pain in bowels (63, xxvii).

1060. Stitches and soreness in

hepatic region, with heat in abdomen (xxx).

Colicky, stretching, tensive and aching pain in belly, as from flatulence (H).

Flatulent colic in hypogastrium, as if he had taken a flatus-producing purgative (H).

Frequent attacks of colic, with distension of abdomen, relieved by discharge of flatus (v).

When sitting, sudden constrictive pain in gall-bladder, taking away breath (xxiii).

1065. Aching in the hepatic region impeding respiration, immediately thereafter pinching pains in supra-umbilical region (H).

Above navel to l., a painless sensation as of cold finger forcing itself from within outwards (H^2).

Warm feeling in abdomen (xix, xxx).

Burning feeling in belly (8, 25).

Burning pains in bowels (51).

1070. A burning in umbilical region (H).

Burning about navel (xix).

Burning sensation in umbilical region, which ran rapidly over her and extended to scrob. cordis, with a sensation of anxious beating and shooting there; aft. some time a rigor ran all over body, with cessation of the hot feeling, and of the painful sensation in umbilical region, aft 1½ h. (H^2).

Compression of navel; immediately afterwards intermitting aching in navel, like jerks (H^2).

Drawing pain in liver (xxvii).

1075. Drawing in of the navel, especially in the morning when fasting (H).

From both sides towards navel, drawing pains in abdomen which are also produced by bending abdomen together (H).

Drawing from left side of hypogastrium towards back; the side of the abdomen is painful when pressed on. (H^2).

Drawing pain in border of l. ilium, which sometimes extends to hip-joint (xxvii).

Drawing pain in groin (xxvii).

1080. Griping and clawing in umbilical region (H^2).

Some pinching about navel, as after taking manna (i).

Pinching pain in umbilical region (H^2).

Cutting in bowels with barrel-like distension of abdomen (v).

In the morning in bed, he cries out and does not know how to compose himself for intolerable cutting pains in abdomen, and he tosses about in bed, aft. 16 h. (H).

1085. Violent pricks in bowels and liver as with needles (xix).

Stitches in abdomen (xix, xxix).

On laughing loud, a sharp stitch in r. side below ribs (H^2).

On inspiring, dull stitches in l. side below ribs (H^2).

Stitches in left hypochonder (xiv).

1090. Violent stitches deep in hepatic region, hindering respiration (xxiii).

Shooting in region of spleen when walking, relieved by standing, removed by sitting (xxiv).

Violent jerks in hepatic region that take away breath (H^4).

Tension in r. groin (xxvii).

Post-mortem appearances.

Liver and spleen congested (73).

1095. Liver, spleen, intestines congested (30).

Liver enlarged, exterior smooth, dark, posterior part nearly black, full of blood (4^a).

Spleen congested (35).

Spleen enlarged, dark, blood-red, full of blood, soft, friable (4^a).

Spleen soft and brittle (15).

1100. Omentum pale and anæmic (4^a).

Fluid contents of abd. thin fluid of bright cherry red colour (4^a).

Duodenum from below upwards congested, darker as it approaches stomach (4^a).

Duodenum bright scarlet, congestion ceasing in jejunum (35).

M. m. of duodenum reddish and injected (50).

1105. Duodenum intensely congested at pyloric end, progressively less so downwards, congestion ceasing entirely at upper end of ileum; transverse colon, liver, spleen and kidneys congested (54).

Small intestines pale rose colour, liver congested, m. m. of stomach congested, reddened, studded with ecchymoses at cardiac end, m. m. covered with layer of yellow mucus, spleen much congested (58).

Bowels red and inflamed, (8).

Mesentery inflamed (8).

Much serum in abdominal cavity (8).

RECTUM AND ANUS.

1110. Sphincter relaxed (73).

Transient paralysis of anus, involuntary evacuations (H).

Feeling as if a warm fluid escaped from anus, occurring about 12 times a day (xxvi).

Feeling as if a warm fluid like blood escaped from anus; though it was dry (xxvii).

Tickling in anus (xxv).

1115. Itching in rectum causing scratching (xxv).

Frequent itching of rectum with discharge of white, hot mucus (xxv).

Itching and pressure in hæmorrhoidal vessels (xxvii).

Pain in rectum, aft. 1 h. (H).

Burning and scraping in anus (xix).

1120. Sore feeling in anus (xii).

Very painful contraction about anus (xxiii).

Stitches darting through anus (xxiii).

Shooting and aching in anus (H).

Shooting burning in hæmorrhoidal vessels (xxii).

1125. Fluent hæmorrhoids (H).

STOOL.

Great discharge of flatus (v, xix).

Very hot flatus (H).

Constipation for 2 days (iii).

Constipation for 3 days (ii, xi).

1130. Stool insufficient (xxii).

Scanty stool (xv).

Very hard stool (xii, xix, xxix).

Hard stool attended with pressing (H^4).

Some hours earlier than usual a hard stool, for which he must strain much (H).

1135. Pain in upper abdomen, with frequent fruitless call to stool (v).

Urging to stool (xxii, xxx).

Urging to stool like tenesmus (xvii, xxx).

Urging to stool, with rumbling in bowels (xxv).

Urging to stool and fæcal evacuation (7).

1140. During stool cutting in bowels, which went through chest like short knife stabs, almost compelling him to cry out (v).

White stool (H, xxix).

White stool, red urine (H).

Sanguinolent discharge from bowels, with frequent tenesmus (67).

Several stools during day (1, 2).

1145. Pappy stool with relief (v)..

With a feeling as if only flatus were passing unexpected discharge of thin fæces, aft. 4 h. (H).

Involuntary stools (30, 33, 58).

Fæces passed involuntarily (10).

Loose bowels, with urging to stool (xxv).

1150. Soft small stools, accompanied by tenesmus, from 3 to 5 per diem (H).

Diarrhœa (20, 22½, 35, 52, 71).

Painless diarrhœa preceded by pinching about navel (i).

Hurried call to stool, with copious loose evacuation with straining (x).

Diarrhœa of greenish fæces (16).

1155. Loose stool (xxiv, xxv).

During day 3 liquid stools of fetid dissolved fæces (viii).

4 loose stools (xxii).

3 soft stools, with rumbling in bowels (xxii).

3 watery stools, with rumbling in bowels and qualmishness (viii).

1160. 3 watery stools, with griping (viii, xxi).

2 watery stools, with cutting in bowels (xxi).

Watery diarrhœa (H, xxx).

Purging and vomiting (37).

Urinary Organs.

Sensitiveness of renal region (xxii).

1165. Pain in kidneys (71, xix).

Stitches in kidneys (1).

Difficulty of urinating (63, iii[a]).

Urine passed with difficulty, dysuria, aft. 12, 18 h. (H).

Urine passed only in drops (2[a]).

1170. Retention of urine (1).

Retention of urine, with hypogastric pain (iii[a]).

Urinary secretion almost suppressed, urine loaded with albumen and casts (65).

Urine suppressed (2[a]).

Urging to urine like tenesmus (xvii).

1175. Anxious urging to urinate, aft. 4 h. (H).

Urging to urinate on touching abdomen (H).

Painful urging to urinate; she must make water very frequently because the bladder fills rapidly with a quantity of urine as clear as water (H[2]).

Urging to urinate; the urine passed in unusually small quantity, not without difficulty, as if it would not come away properly, but without pain; at the same time slight pinching in the umbilical region from smelling the tincture (H[2]).

Tenesmus of neck of bladder, aft. 4 h. (H).

1180. Urine copious and anxiety at commencement of micturition (xxii).

Diuresis (71, iv, v, i^a, vi^a).

Frequent micturition (ii, v, xxv, xxvii).

Urine passed involuntarily (10, 33).

Transient paralysis of neck of bladder, involuntary discharge of urine (H).

1185. Copious discharge of urine, which, on standing, deposits blood (H).

Frequent emission of clear urine like water (xii).

Watery constituents of urine increased, salts diminished (xviii).

Urine, sp. gr. 1023, normal in colour, very acid, precipitating phosphates (58).

Urine dark coloured and scanty (xix, xxx).

1190. Urine hot and high coloured (v, xxix).

Urine thicker and hotter, passed with burning in urethra (xxii).

Urine clear, reddish (iii).

In morning urine red, and when passed burning in orifice of urethra (ii).

Brown urine passed with burning, afterwards depositing brick-coloured sediment (H).

1195. The urine passed in morning brown, on standing turbid with dirty brown sediment (viii).

On passing urine a slight sensation of splashing in vesical region (H^2).

Burning along urethra when urinating (i).

Burning in neck of bladder when not urinating (H).

Violent stitches at orifice of urethra (xxii).

1200. Stitches darting through urethra (xxiii, xxvii).

Dull shooting pain in navicular depression of urethra (xix).

Severe shooting in fossa navicularis, esp. when urinating (xix).

Violent shooting in glans penis when urinating (xvi).

Shooting and pinching in glans penis when urinating (H).

1205. Pain in bladder when walking, aft. 4 h. (H).

Post-mortem appearances.

Kidneys full of blood (15, 30, 35, 54, 58, 73, 4^a).

Bladder contracted, contained ℥ss of urine, milky from lithates (35).

Male Genitals.

Slight not disagreeable creeping in genitals (H^2).

Retraction of scrotum (xxvii).

1210. Sweat on scrotum and itching there compelling him to scratch till blood came, allayed by cold washing (xii).

Smarting and itching on scrotum (xii).

Itching on prepuce, relieved by rubbing, but soon returning, aft. 3 d. (H^6).

Voluptuous itching in glans penis (xix).

Pricking formication in glans penis (xxii, xxix).

1215. Simple pain in testicles, like that which remains after being squeezed, aft. 2 h. (H).

Continued pain in r. testicle (xix, xxii, xxix).

Continued pain in l. testicle (xix).

Diminished sexual desire (H).

He has amorous fits (H^2).

1220. Sexual desire increased (v, xvi, xxiii, xxvii).

Very much increased sexual desire, rapidly alternating with relaxation (H^2).

Frequent erections and

greatly increased sexual desire (xxvii).

Frequent erections and pollutions without voluptuous dreams (vii).

Nocturnal pollution (xxix, vi[a]).

1225. Seminal emission without voluptuous sensation (xix).

Emission with voluptuous sensation (xix).

P.m. Erection of penis and escape of semen (50).

Female Genitals.

Metrorrhagia (H).

The menses that had ceased the day before taking the drug, broke again copiously immediately, aft. ½ h. (H[d]).

1230. Increase of milk in breasts (H, 59).

Nasal Respiratory Function.

Impeded respiration through nose, esp. during sleep (H).

Violent sneezing (xxvii, xxix).

Frequent violent sneezing with pain in abdomen (H[2]).

Cannot sneeze thoroughly on account of pain in l. costal region (H[2]).

1235. Transient feeling of coryza (xxv).

Feeling as if coryza were commencing, frequent sneezing with stitches in chest (ix).

Attacks of catarrh and coryza, between 8 and 12 h. (H).

Severe coryza (i, xxix).

Fluent coryza in morning (xiii).

1240. Coryza with flow of thin mucus (xix, xxix).

Clear water flows from nose frequently (xxv, xxvii).

The coryza present became dry (v).

Nose quite dry (xxvii).

Larynx and Trachea.

Voice very weak (71).

1245. Can scarcely speak audibly (9, xxix).

Articulated with difficulty (45, 58).

Power of articulation gone (18, 36).

Could not speak owing to spasms of respiratory muscles (54).

Could not speak owing to dryness of throat (56, ii).

1250. Could not speak, made a stertorous noise when breathing (59).

Aphonia for 2 weeks (36).

Speechless (22½, 47, 58).

Peculiar, clear, short moaning (3[a]).

Sensation as if windpipe under sternum had gone to sleep and were numb, aft. 8 h. (H).

1255. Painful burning in larynx (v[a]).

He is apt to choke on swallowing saliva (H[2]).

Morbid condition (attacks of paralysis?) of epiglottis; food and drink are apt to get into windpipe when swallowing, so that they threaten suffocation and excite coughing; he is apt to swallow the wrong way (H).

Morning hoarseness, aft. 8 h. (H).

Hoarseness, dry cough (xxix), dry feeling in trachea (xiii).

1260. Feeling as if larynx were compressed on both sides (xix).

Feeling of constriction of throat (iv).

Spasmodic contraction of laryngeal muscles (71).

Roughness of throat spreading down trachea exciting frequent coughing (xix).

Roughness of throat, frequent secretion of mucus from larynx (xiii).

1265. Irritation to cough (ii^a).

Dryness of throat causing irritation to cough (xii).

Constant tickling in larynx when smoking (xxii).

Tickling in larynx causing cough (ii).

Tussiculation from a tickle at upper part of larynx, immediately (H).

1270. After midnight, every ½ h., a short cough, from a tickle in larynx; the more he tries to suppress it the more frequent and worse it was (H).

Disagreeable scraping in throat excites dry cough (ix).

Fatiguing cough (ii).

Short cough (H).

Dry cough (xxvii).

1275. Dry, short cough (ix, x, xxix).

Dry cough esp. violent in warm room (xiii).

Cough after drinking (H).

Severe cough, immediately, from a little tobacco smoke (H).

He (a habitual smoker) cannot smoke without clearing his throat and coughing, either because the epiglottis allows the smoke to penetrate into the windpipe or because the larynx has become too sensitive, aft. 6 h. (H).

1280. Irritation in larynx and dry cough (xiii).

On coming from open air into warm room irritation to cough in larynx and dry cough (xxiii).

Dry cough causing pain in larynx (xxiv).

Change of temperature excited dry cough with sore pain in chest (xxiii).

Cough during the heat of the body (H).

1285. Dry cough with soreness of chest and larynx (xxiii).

Cough with stitches in chest (ix).

Dry cough with sore feeling behind sternum (xxiii).

A violent cough with sharp stitches in various parts of thorax, compelled him to lie always on his back, as lying on either side aggravated it (ii).

Hoarse, dry, resonant cough, during which eyes water (xxiv).

1290. Frequent cough with shaking pain in chest, expectoration rust coloured (ii).

Cough with scanty frothy mucous expectoration (xiii).

Coryza, violent cough with peculiar dull tone, very fatiguing to chest, rather dry, rare expectoration of thin white mucus (xiii).

Tracheal rattling (3^a).

Rattling and vibration in trachea (10).

1295. Hawking of fluid saliva (xii).

Cough with easy expectoration (ii^a).

Cough from irritation in larynx with expectoration of gelatinous formed mucus, then sensitiveness of larynx to inspired air as if it were deprived of its protective covering (xxvii).

Cough with expectoration of sweetish salt fluid (xxvii).

Expectorated thin white mucus streaked with bright red blood (xiii).

1300. After coughing hawked up mucus streaked with blood (ii).

Frequent dry cough with expectoration of bright red blood (xxi).

Hæmoptysis (H).

CHEST AND RESPIRATION.

Fluttering in chest (63).

Creeping pain in chest (H.)

1305. Crawling in chest, as from beetles (H).

Weariness and exhaustion in chest (ii).

Heaviness in chest (xiii, xxi, xxii).

Heaviness and fulness of chest (iii).

Heaviness and fulness in chest when walking, he felt as though the chest could not be expanded, compelling him to breathe deeply often (viii).

1310. He feels a weight in chest; it is as if the whole chest were compressed from all sides (H^6).

Feeling of weight under sternum preventing deep breathing, like a peculiar painful, but transient pressure from sternum to spine, occasional flying stitches in l. pectoralis major, and intercostal muscles (xvi).

Oppression of chest, as if a great weight lay on it (ix).

Heat in chest (17, xxiii).

Hot feeling in chest, immediately (v).

1315. Hot feeling in and over chest (v).

As if boiling water were poured into chest (ix).

Burning in chest (25).

Burning and heat in lung (xii).

Burning under sternum (xix).

1320. A burning pricking pain in chest (H).

Sensitiveness of chest all evening (ii).

Thorax painful externally in various parts, esp. r. side (xxiii).

Pain in chest (1).

On posterior surface of sternum a constant feeling of soreness all day, as if he had been struck (ii).

1325. Chest oppressed, with sore pain under sternum on breathing deeply (xxvii).

Bruised pain in ribs (v).

Pain as from a bruise in lowest rib, much increased by touching, and about which patient makes much ado and complains (H).

On middle of sternum, pain as if bruised, increased by touch. (H.).

A digging boring pain from r. scapula forwards to chest, that was increased by inspiring, but not by expiring, but never ceased, for 12 m. (H^1.)

1330. Dull pain behind sternum (xxiii).

Aching in chest, sometimes r., sometimes l. side (xxvi).

Aching pain in chest, somewhat relieved by bending upper part of body backwards, returning immediately on resuming erect posture, aft. 12 h. (H^6).

Pressive pain in r. thorax (iii, xvi).

Pressive pain in region of l. 2nd rib near sternum, confined to a spot the size of the palm, increased by deep inspiration (xxvii).

1335. Pressive pain in uppper part of left side of chest, the muscles there sensitive to touch (xxvi).

Pressive tightening pain in side of chest (H.).

Deep breathing hindered by feeling of compression in central anterior part of chest, or by persistent pinching together, esp. in r. side of chest inferiorly, or by violent stitches deep in hepatic region (xxiii).

Pinching tugging pain in r. side of chest between 3rd and 4th ribs, unaltered by anything,

until it disappears of itself (H^1).

Squeezing together of chest on right side near sternum, a kind of tightness of chest (H^2).

1340. Squeezing pains in chest (H).

Pressive squeezing pain in chest under sternum (H).

Growing pain in r. clavicle (xxvii).

Prickling in chest (41).

Violent pricks in rapid succession in l. half of chest, from without inwards (xxii).

1345. Stitches in chest, on breathing (H^2, xxx).

Stitches dart through chest (ix, xxiii).

Pains in chest like shooting, interrupting breathing (H).

Stitches in sides of chest (xiv).

Periodical stitches through chest, accompanied by dry short cough (ix).

1350. Stitches in both sides of chest, sometimes deep, sometimes superficial (xix).

With anxiety and peevishness, shooting in side of chest, followed by throbbing in side of chest, then pressive headache (H).

Flying stitches in chest here and there, full feeling in chest, pressive pain in sternum (viii).

Single large stitches in side through to back, aft. 24 h. (H).

Violent stitches in region of 8th, 9th and 10th ribs, first r. then l., oppression of chest (xiii).

1355. Transient stitches in lower part of chest, about false ribs (xxvii).

Flying stitches along sternum and between ribs (ii).

Frequent stitches in middle of sternum (ii).

Shooting pressure under sternum (xxii).

Shooting aching pain in r. side of sternum (H^6).

1360. Violent stitches in r. half of chest, with loss of breath (xxii).

Contractive shooting pain in r. side of chest (xxiii).

In evening a very severe burning stitch in l. half of chest, sometimes extending to loins (xiii).

Painful stitches in r. side of chest, in region of lowest rib, which extend towards sacrum, aft. 10 h. (H^6).

Shooting in r. side, with complaining, lacrymose disposition (H).

1365. In l. side of chest, near axilla, oppressive, obtuse stitches (H^2).

Drawing shooting in l. chest (xii).

Shooting pain in l. half of chest, with anxiety and warm feeling in cardiac region (xxii).

Woke from afternoon siesta with shooting in l. upper part of chest as from flatulence (xii).

Painful stitches in l. upper thorax, esp. on inspiration; dyspnœa (ix).

1370. Frequent stitches in l. side of chest (ix).

Shooting in l. lower half of chest (xxiv).

At every breath shooting from lowest rib on r. side, extending to apex of scapula through middle of chest, with complaining disposition (H).

On breathing feeling as if air passages were enormously wide, so that the air can pass with extraordinary facility in great streams in and out at each breath (xxvii).

Anxiety in thoracic cavity and oppression in r. half of chest, then in whole chest (H^2).

1375. Oppression of chest (xix, xxiii, xxvii, xxx).

Oppression and anxiety of (16).

Oppression of chest, causing frequent inspirations (xix).

He feels as if chest were contracted (H^2).

Contractive pain in chest, as if the ribs on both sides were drawn towards one another (H^1).

1380. Contraction of muscles of abdomen and thorax causing her to spring up in bed (70).

Constriction at chest (42).

Tightness of chest (1, xi).

Tightness of chest, with strong, loud respiration (H).

Tightness and pressive feeling in chest, esp. r. thoracic cavity, posteriorly and inferiorly, frequent deep breathing (xix).

1385. Breathing very tight (xxiii).

Oppression of breathing (15, 30, 71).

Breathing oppressed, with constriction of chest (vii).

Oppression of breathing, with pressure under sternum (i).

Difficulty of breathing (56, 70, 2^a, i, xxx).

1390. Difficulty of breathing, with anxiety (xi).

Difficulty of breathing, esp. in l. side in cardiac region (i).

Dyspnœa (15, 36, 41, 66, 68, 71, ix, xxi, ii^a).

Dyspnœa, ameliorated by coughing (ix).

Great dyspnœa, almost suffocating him (68).

1395. Fear of suffocation (6).

Breathing irregular (69).

Breathing irregular, a catch followed by a sigh (67).

Orthopnœa (12).

Breathing quick (xvi).

1400. Breathing hurried and short (51).

Breathing hurried and laboured (52).

Breathing shallow, hurried (73).

Respiration weak and shallow (70).

Breathing oppressed and quick (vii).

1405. Breath hot, respiration quick, at each deep breath oppression, anxiety, and painful stitches between scapulæ or on side of chest, mostly r., but most severe from scapula to spine (xvi).

Oppression of breathing, shallow, quick breathing, with frequent deep breathing and sighing (iii).

Short, incomplete, and laboured breathing, sighing (10).

Short respiration in sleep, aft. midnight (H).

Breathing very laboured, short, superficial, 40 (3^a).

1410. Breathing short and scarcely perceptible (7).

Respiration catching (70).

Respiration a gasp, 5 or 6 per minute, then he would convulsively straighten out, throw head and shoulders back, and hands over head, as if to get a longer respiration, then relax as before (45.)

Gasping for breath (75, iv).

Desire to draw a long breath (29).

1415. Frequent deep breathing while dressing (viii).

Must breathe deeply to give his circulation an impulse through lungs (xxvii).

Oppressed and sighing breathing (vi^a).

Frequent sighing (xix, xxi, xxiii).

Paroxysms of sighing (24).

1420. Frequent sighing on account of distinctly felt accumulation of blood in lungs (xxvii).

Breathing stertorous (46).

Breathing stertorous, mucus

râles heard at a distance (19).

Resp. difficult and slow with feeling as if throat and chest were constricted (iv).

Anxiety that impedes respiration, with warm sweat on forehead (H).

1425. Laboured breathing (30, 44, 52, 53, 64, 65, v[a]).

Laboured breathing with rattling (9).

Slow laboured breathing (9, 48).

Respiration much retarded (56).

Respiration at one time slow, then quick and shallow (63).

1430. Breathing slow, with whistling sound caused by relaxation of lips and cheeks (46).

Breathing extremely slow and slightly stertorous (47).

Breathing got slower and slower, and at length ceased (47).

Respiration 10 (71).

Respiration required artificial aid (45).

1435. General stoppage of resp. (13).

Breathing ceased (65, 71).

No respiration or circulation aft. 4 h. (60).

Noisy, loud respiration, with open mouth (H).

Breathing rattling (2[a]).

1440. Breathing rattling, moaning, quick (2[a]).

Great rattling in chest (2[a]).

Mucous râle in lungs posteriorly (12).

Post-mortem appearances.

Parenchyma of lungs full of blood, scarcely crepitating (13).

Lungs congested posteriorly (50).

1445. Lower lobes of lungs filled with black blood, large vessels almost empty (15).

Lungs crepitated, vesicular emphysema, when cut exuded much frothy, sero-sanguinolent fluid, bronchial m. m. congested, more rugose than normal (54).

Lungs heavy, bluish, posteriorly violet, hardly crepitating, filled with blood (8).

Lower part of lungs engorged and œdematous (58).

Lungs inflated and emphysematous, both lower lobes congested (35).

1450. Lungs intensely emphysematous, pale in front, congested behind (73).

HEART AND CIRCULATION.

Placed hand on heart (53).

Disagreeable feeling about heart (iv).

Trembling of heart (xxii).

Trembling and tendency to palpitation of heart (H).

1455. Anxiety in cardiac region with quicker and stronger heart's beats (xxvii).

Precordial anxiety (6, xvii, xxvii).

Precordial anguish (3[a], xii).

Anguish in cardiac region (3[a]).

Oppressive anguish in precordial region (2[a]).

1460. Oppression of precordia (10).

Oppression in cardiac region (36).

P. 78, great oppression in cardiac region (63).

Pressive pain in cardiac region (viii).

Compression of chest in region of heart (H[2]).

1465. Heaviness at precordia (2).

Feeling about heart as if a heavy body lay there (v).

Crampy feeling at heart (v).

Pressure and burning at heart (v).

Warm feeling about heart (v, xxii).

1470. Burning at heart (22).

Burning and shooting about heart (v).

Stitches in cardiac region (xiv, xv, xix).

Morning on rising, acute lancinating stitches in cardiac region apparently in pleura costalis preventing standing up straight, and deep inspiration with irritation to cough; the part of chest affected sensitive to pressure (xxvii).

Slow blows in cardiac region directed towards outside of chest (H^2).

1475. Very perceptible heart's beats when sitting and lying (xix).

Heart's beats could be distinctly felt and were in quick succession (ix).

Violent and quick beating of heart (xi).

Very quick, strong heart's beats (v).

Heart's beats strong, p. fuller than usual, hard and strong, moderately quick (iii).

1480. Palpitation of heart (v, viii, xiv, xxi, xxx).

Palpitation of heart with anxiety (iii, x).

Palpitation of the heart with great anxiety; oppression of breathing and great weariness in all the limbs; it runs thence into head, and she is as if stupified from flying redness in face (H^2).

Palpitation of heart and anxiety and increased heat of body, especially in face (H^2).

Palpitation of heart with anxiety and dyspnœa (xi).

1485. Oppression of chest and palpitation of heart (xxvii).

Palpitation of heart, lasting all day, worse when walking, better when at rest (ix).

Palpitation of heart when walking, flying stitches in cardiac region, sometimes even when at rest (viii).

Violent palpitation of heart (xi).

Violent palpitation of heart with disagreeable feeling in cardiac region (v).

1490. While sitting quietly, sudden violent palpitation of heart with tight feeling in chest (ix).

Weak heart's beats (10, 50).

Heart's action feeble, irregular, intermittent, p. not felt at wrist (43).

Heart's action weak and irregular (55).

Heart's sounds scarcely audible (26, 39, 67, 68, 74, 1^a).

1495. Heart's sounds only heard at apex, scarcely distinguishable (3^a).

Heart's action weak, irregular, quick (3^a).

Heart's sounds and p. disappeared (3^a, iv).

Heart's sounds feeble (52)

Only an occasional flutter could be heard at heart (65).

1500. P. and heart's action slow and faint (44).

Diminished impulse of heart from exertion (63).

The heart beat only once against thoracic walls while the p. beat three times, but the beats of the l. ventricle were synchronous with the p., the r. auricle seemed to be in a constant convulsed state, its movements were quick, irregular, and in no relation to the movement of the ventricles (12).

Heart's action tumultuous, the two sounds scarcely separable (58).

Pulsation of carotid and temporal arteries when sitting (xii).

1505. P. full (xiv).

P. full, strong and quick (xvi).

P. contracted, hard, moderately quick (iii).

P. 72, contracted, hard (xxvii).

P. quicker (10).

1510. P. at first quicker (vii).

P. quicker and stronger (xi).

P. febrile, heard it in head (xiii).

P. quick (iv).

P. quick, palpitation of heart (xv).

1515. P. quick, almost uncountable (58).

P. of fair size, uncountable, very weak and unequal (58).

P. full, 80 to 90 (ix).

P. quick, full (i, xii).

P. quick, irregular (9).

1520. At 5 p.m. p. 102, full and hard (v).

P. full and rapid (27).

P. 75, small and feeble (70).

P. 84 (59).

P. 88 (61).

1525. P. quick, 96 (ii).

P. 120, weak, intermitting, aft. 3 h. (25).

P. 125 aft. 7 h. (19).

P. 130, feeble (20).

Pulse intermittent and febrile (1).

1530. P. intermitting every 4th beat (10).

P. intermittent and irregular, there occurred 2 or 3 beats in rapid succession, then a stop of as long or longer duration (7).

P. intermitting, 5 beats in hard rapid succession, 6th intermission, lasting all day (i).

P. irregular and intermittent, irregularity both of rhythm and strength (67).

P. irregular, intermittent, finally imperceptible (57).

1535. P. irregular (71).

P. irregular, 60, aft. 2 h. (60).

P. irregular, 130, (63).

P. becomes more irregular, sinks to half normal, often intermits, and is sometimes dicrotic (iv).

P. at first accelerated, afterwards slower, 47 (ii[a]).

1540. P. sluggish, not feeble (48).

P. slow (41).

P. got slower and slower (47).

P. slow, weak (36, 46, 56).

P. slower, irregular, small, and weak (iv).

1545. P. unequal, slow (12).

P. slow, almost intermittent (ix).

P. slow, intermitting (11, 21).

P. slow, scarcely perceptible (39).

Pulse slow, unequal, soft and feeble, as though the blood did not fill the arteries (12).

1550. P. 67, small, easily compressible at 3.30 p.m. (v).

P. 45 (23).

P. 45, feeble, intermitting (42).

P. 45, hardly perceptible (51).

P. very slow, 40 (vii).

1555. P. 36, feeble (36).

P. 32 (71).

P. in sleep 20, when roused 40 (48).

P. slow, intermitting, scarcely perceptible (35).

P. 100, weak, irregular, aft. 15 m. (25).

1560. P. 80, weak (66).

P. feeble (40).

P. very feeble, scarcely perceptible, quick, and flickering (74).

P. very feeble, 40 (47, 48).

P. weak and quick (57).

1565. P. weak, regular (24).

P. weak, irregular (45).

P. weak, irregular, thready (55).

P. small (10, 16, 30).

P. small, soft, 80 (62).

1570. P. 51, small, weak, and intermitting, can scarcely be counted (vii).

P. small, weak, dicrotic, sometimes scarcely perceptible (3^a).

P. at first along with warmth, more frequent, soon sinking below normal, small, weak, and occasionally dicrotic (i^a).

P. 81, soft and feeble (72).

P. small, weak (16).

1575. P. small and feeble, 66 (53).

P. small, hardly perceptible (50).

Pulse hardly perceptible (2, 17, 28, 30, 54, 55, 70, 73, 74, 3^a).

P. almost imperceptible, intermittent (54).

P. feeble and fluttering, soon intermitting, the intermissions becoming longer until it ceased to be felt (43).

1580. P. imperceptible aft. 3 h. (60).

Pulse could not be felt (7, 10, 26, 34, 39, 43, 45, 46, 50, 56, 58, 64, 65, 67, 68, 69, 71).

Radial and temporal arteries pulseless (19).

Pulse imperceptible in axilla for 3 h. (65).

Coldness and pulselessness of extremities (10).

1585. Failure of circulation (67).

Gradual stoppage of circulation (13).

Thought he felt a stoppage and interruption of the circulation of the blood in all his limbs, from the wrists to the finger tips and from the ankles to the toes he felt no circulation at all (7).

Blood drawn has a buffy coat (9).

Post-mortem appearances.

Blood partly fluid, partly coagulated (8).

1590. L. ventricle empty, r. filled with clotted blood (13).

Dark fluid blood in both ventricles (26).

Heart flaccid, r. side contained slightly coagulated blood, l. side empty (34).

Dark fluid blood in large vessels (35).

Pericardium contained ℥j of fluid (35).

1595. Small, black coagulum in auricle (35).

L. ventricle firmly contracted, ℥iij of blood in auricle (35).

R. side distended with dark fluid blood, l. contracted and empty (50).

L. ventricle firm and resistent, r. flaccid, empty, blood fluid (54).

All cavities of heart contained fluid blood, some black clots in r. side, l. ventricle under influence of rigor mortis (58).

1600. L. ventricle midway between contraction and dilatation, r. ventricle and veins full of dark fluid blood (73).

R. ventricle holds much bright-red, thin fluid blood, coronary arteries full of blood, much bloody serous fluid in pericardium (4^a).

FEVER.

All day slight coolness which at 6 p.m. passed into chilliness, often recurring in course of evening (xxv).

Chilliness (2, 2^a, xix, xxvi, xxvii, xxix).

Anxious chilliness, aft. 3 h. (H.)

1605. Chilliness with thirst (ix).

Felt very chilly causing him to heap on more bedclothes (7).

Attack of faintness with chilliness (H).

In evening chilliness in warm room (xiii).

Sudden chilliness going off when eating, noon (xxv).

1610. Chill on slightest movement, aft. 10 h. (H^2).

Chilliness in abdomen (H^2).

On waking from afternoon siesta, chilly feeling all over, with cold r. upper arm, l. being warm; the chill lasted while walking in open air and in warm room till 7 p.m., when it gave place to disagreeable warmth (xii).

Great anxiety as if the blood would come out of all the vessels, with constant chilliness and cold face in warm room, both in open air and when moving (xii).

Three attacks at short intervals of chilliness beginning at middle of spine and spreading to both lumbar muscles, and in spite of warm room, feeling as after taking cold, with transient heat of head (xxii).

1615. Chilly feeling from crown down back to coccyx (xxii).

Chilliness commencing along spine, with goose skin and formication along galea aponeurotica (xxvii).

Chilliness in back with cold extremities (xii, xvi).

Chilliness as if between skin and flesh, esp. over back and abdomen (xxvii).

Internal chilliness from back over lower limbs, whilst upper limbs are warm, with cold sweat, face icy cold to touch (xii).

1620. Chilliness and formication, esp. betwixt shoulders and down back, like commencement of ague fit, tips of fingers and toes icy cold (xxvii).

Chilliness between shoulders in warm room (xxvii).

Towards evening, chill and coldness of hands and feet, then sickness in middle of sternum, which continues even when taking food that tastes well, though there is neither appetite nor dislike for food; after eating the sickness goes off, followed by heat of face, accompanied by sad despairing thoughts (H).

In afternoon chilliness or even coldness all over body, esp. in feet and knees (v).

Coldness (19, 21, 22, 22½, 49, 55, 60, 64, 65, 69, 70, 3^a, ix).

1625. Coldness all over body (H).

Cold as if under skin (xvi).

Great coldness on waking (xxvii).

Shivering followed by icy coldness (19).

Icy coldness through him (ix).

1630. Icy cold sensation creeps upwards from feet (2^a).

Coldness all over body, face pale and fallen in (xxvii).

General coldness, esp. of extremities (16).

Skin cold (25, 30, 43, 58, 59, 69, 71, iv.)

Skin dry and icy cold (iv, vii).

1635. Skin is coldish, covered with moisture (27).

Skin cold and perspiring (34, 35).

Skin cold and clammy (26, 41, 50, 51, 58, 64).

Coldness of extremities (17).

Hands and feet cold; face hot (iii).

1640. Coldness of hands and feet, shivers over whole back, whilst head and abdomen are warm (xxvii).

A coldness runs continually up arms and legs; in her face also she has a chill (H^2).

Limbs cold, bedewed with clammy perspiration (67).

Diminished temperature of skin, afternoon (xxv).

Temp. 97·5° (71).

1645. Temp. aft. 4 h. 95·5° (70).

Temp. 89°, 84°, (68).

Rigors (38, ix, xvi).

Slight rigors in short fits (xvi).

Rigor over back and arms (H^2).

1650. Rigor and frequent yawning, in morning aft. rising (H^2).

At first coldness, rigor and paleness of finger tips, then in fingers, afterwards sensation of cramp in soles and calves, finally chill in forehead, aft. ¼ h. (H).

When walking in forenoon rigor all over body with pale face and fallen-in features (xxvii).

At 11 a.m. violent rigor spreading over back and chest, also recurring on the least movement during the subsequent heat (ii).

After midnight wakened by violent rigor, it came in fits every 5 m., proceeded from precordial region and was lost in extremities, followed by dry burning heat, febrile pulse, lasting 2 h., woke in morning in profuse sweat (xiii).

1655. Shivering (70, ix).

She is chilly and shivers (H^2).

Shivering on lying down, evening (H).

A shiver runs through her from below up into chest (H^2).

Shivering over back, esp. evening (i).

1660. Slight transient shiver over back (xii, xxx).

Shivering here and there, esp. in upper limbs and legs (xxvii).

Shivering over lower, then over upper extremities with goose-skin, the shivering seems between skin and muscles, increases to rigor, esp. when standing or lying, going off on walking quickly in open air (xvi).

In evening chilliness followed by warm feeling, ending at night in profuse sweat (xii).

On lying down chilliness; at midnight general perspiration (xix).

1665. Rigor lasting 1 h., then excessively profuse sweat, that completely soaked the bed clothes till morning (xiii).

Rigor lasting 5 m. followed by considerable heat and profuse perspiration (xi).

Transient coldness, with momentary shivering followed by heat and sweat (xi).

Fever: coldness with stiffness of whole body, redness and heat of one cheek, coldness and fulness of other, with open staring eyes, and contracted pupils, which only dilate slightly and slowly in the dark (H).

Fever: chill of whole body, with hot forehead, hot ear-lobes, and internal dry heat (H).

1670. Alternate attacks, aft. 3, 4, 6 h.: either along with redness of cheeks, silly gaiety, with sensation of heat all over body, and headache on moving eyes upwards and sideways;

Or, along with redness of cheeks and heat of head, shivering all over body with proper taste in mouth;

Or, along with redness of cheeks, shivering, with weeping accompanied by headache;

Or, along with redness of cheeks, an obstinate contrary disposition, burning in umbilical region, and aching pain in head (H).

Skin warm (iii).

1675. Warmth extending over body (i[a]).

Agreeable warmth on skin (xxii).

Agreeable warmth spreads all over body (v).

When sitting still agreeable warmth, esp. from back over whole body, with moderate sweat (v).

Flying heat (i).

1680. Flush of heat (v).

Increased heat, tossing about in bed at night (xxiii).

Heat of whole body (xiv, xv, xxvii).

Troublesome heat at night (xii).

Heat of skin (ii, iii).

1685. Skin burning hot (9, 63).

Inward heat and thirst (6).

General heat with thirst (H).

Glowing sensation in body (iii[a]).

Glowing tingling feeling over body (iii[a]).

1690. Numbing glow in body (iii[a]).

Internal heat, with external coldness (xxx).

Heat, with throwing off bed clothes (H).

Dry heat throughout body (ix, xxii).

Towards evening dry heat in face with anxiety (H).

1695. Hot in head, with forehead hot to touch, and rigor of rest of body, on the slightest movement (H).

Towards evening, burning heat in head and face, with redness of cheeks, and out-pressing headache; at same time rigor all over body with thirst, aft. 14 h. (H[2]).

Heat in head, cheeks, and hands, variable temperature later (vi).

Feeling of heat, first in hands, then in whole body, even in chest, without perceptible external heat, aft. 4 h. (H).

Several times heat ran over his back (H[2]).

1700. Burning in upper part of body, esp. face, as if sweat were about to break out (xix).

Disagreeable heat of whole body, esp. lower extremities (xii).

Great heat from 10 p.m. till after midnight, with short breath; she wished to cough but could not, speaking also was difficult for her; at the same time extreme restlessness and crying out from pains in the hands, feet, abdomen and sacrum; she stamped her feet, and would not allow anyone to touch her (H).

In evening, greatly increased temperature of body, with swollen cutaneous veins (xii).

Nocturnal fever, 4 nights (ii).

1705. Extreme redness of cheeks, with peevish, complaining, lacrymose disposition, aft. 3 h. (H).

Return of warmth and slight perspiration (7).

Very warm and perspiring on walking (vii).

Heat ending in sweat (xvi).

During heat, moderate thirst for beer (H).

1710. She drinks little in the heat, and yet has dry lips (H).

In the heat the cough is troublesome (H).

Warmth, interrupted by shivering (xvi).

Heat and chilliness (ix).

Cold and heat alternately all day (ix).

1715. Alternate heat and cold, in places goose-skin, which went off when sweat appeared (xvi).

General transpiration and actual sweat on extremities and whole body (xx).

Increased transpiration with general warmth (v).

Perspiration of weakness (H).

Slight perspiration all over body (H).

1720. Whole body warm, perspiring (ii[a]).

Perspiration (ix, v[a]).

Sweat after midnight with relief (ii).

Perspiration with febrile rigor. aft. 3 h. (H).

General warm sweat (iii).

1725. Profuse sweat (v).

Profuse perspiration towards morning (ii).

Surface covered with profuse sweat (54, 66).

Profuse sweat after convulsions (12).

At night, profuse but transient sweat all over body, and continual unusual transpiration, and again in morning profuse transient sweat (v).

1730. Sweat bursts out over forehead and precordia, later sweat all over body, esp. head, nape, chest and abdomen, while feet felt as if cold air blew on them (v).

Cold sweat (13, 28, 68, i[a]).

Profuse cold sweat (60).

Cold clammy sweat (2[a], 3[a]).

Hands, feet and forehead covered with cold sweat (7).

1735. Sweat on inner surface of thighs (xii).

Sour smelling perspiration all over body (H).

Neck.

Skin of neck numb (61).

Nape stiff (2, 23, xix, xxvi).

Stiffness with bruised feeling in l. side of neck to shoulder-joint and part of back, agg. in bed and when lying, amel. by movement and open air (xxii).

1740. On turning head, tension in cervical muscles, esp. sterno-cleido-mastoideus and its insertion in mastoid process (xxvii).

Twitching and spasms of cervical muscles (70).

Weariness and pain in nape (v).

Acute agonizing pain in nape (48).

Bruised pain in nape on moving it, as if confined to certain muscles, esp. evening and night when lying down (v).

1745. Aching pain in the left cervical vertebra (H[6]).

Pain in neck pressing inwards towards trachea, like pressure with point of finger into neck (H[1]).

Drawing pain in nape (xxvii).

Drawing in r. side of nape (v).

Painful drawing in r. cervical and nape muscles (xii).

1750. Drawing pain in r. side of neck into r. ear and r. shoulder (xxvi).

On moving neck, drawing pain in l. side of nape and l. scapula (xxvi).

Drawing and stiffness of nape (xxiii).

Pricking externally in neck (H).

Single shoots in nape on both sides (H[5]).

1755. Shooting and drawing in l. side of nape (v).

Jerking pain in nape with stiffness (xix).

Rheumatic pain in the nape only observed on moving the neck, between the 5th and 9th h. (H).

In the nape a pain as if the flesh were detached, with a feeling as if the nape had no firmness, and as if the head would fall forwards in consequence; on moving the head shooting in the nape (H^2).

P. m. Muscles of neck prominent and rigid (35).

Back.

1760. Slight chills over back (v).

Coldness over back (vi).

Coldness along spine (30).

Flush of heat over back (v).

Numbness over back (65).

1765. Benumbed feeling in lower half of back (55).

Crawling pain in spine as from beetles (H).

Muscles of back rigid (23).

Stiffness of back and neck (29).

Pain in spine (39).

1770. Pain as if bruised from sacrum through back up to nape, aft. 4 h. (H).

Prickling in back (41).

Stitches in back (xxiii).

Violent shooting, digging pain all down l. side of spine to sacrum, which was so much increased by inspiration that tears came repeatedly into eyes, for 4 h. (H^1).

Painfulness of scapula (xxiii).

1775. Drawing pain in lower angle of l. scapula (xxvi).

Bruised pain between shoulders (xiii).

Stitches between scapulæ (xvi).

Shooting pressure between scapulæ (xxii).

Burning, corrosive pains near dorsal vertebræ on r. side (H^6).

1780. Violent drawing pain increased by pressure in dorsal and lumbar region along sacro-lumbalis and longissimus dorsi on both sides of spine, so that every movement of trunk was difficult, lasting 5 h. (xiv).

Pain in lower part of back (24).

Cutting round from spine to abdomen, over l. hip. in a circle (H).

Sensitiveness in lumbar region on treading heavily (xxiii).

Drawing pain in lumbar region relieved by bending small of back (xxvii).

1785. Pressure in r. lumbar region (xix).

Sudden pressure in r. lumbar region (xxiv).

Tension in lumbar region, for 3 d. (xiv).

Tension in lumbar region, causing him to bend backward (xxvii).

Tensive aching pain in lumbar vertebræ, or as if from a bruise; at same time pain in abdomen as from flatulent colic (H).

1790. Numb feeling in sacrum to lower extremities (xii).

On moving painful stiffness of sacral and hip-joints; he is as if paralysed in sacrum, aft. 2 h. (H).

Sensitiveness in sacral region (xxii).

Burning in sacrum (25).

Bruised pain in sacrum (xxii).

1795. Pain as if bruised in articulation of lowest lumbar vertebra with sacrum; the sacrum feels hacked off (H).

On l. side near sacrum a painful boring (H).

Aching in sacrum (xix).

Aching pain in l. side of sacrum (H^4).

Pressive pain in sacrum, increased by stooping (xix).

1800. Paralytic pressure in sacrum, relieved by moving and bending backwards (xxii).

Pricking formication at symphysis of sacrum and ilium changing gradually to a paralytic pressive pain (xxii).

Shooting and drawing in sacrum (xii).

Tensive aching pain in sacral and lumbar regions, most felt when treading (xxiii).

Shooting burning, with hot feeling in coccyx (xxii).

Upper Extremities.

1805. Trembling of arms and hands immediately (H^4).

On bending hand up and down a trembling movement in wrist-joint (H^5).

Twitchings in hands and arms (2^a).

Clenching of hands (22, $22\frac{1}{2}$, 39).

Violent permanent spasms in both arms and fingers (48).

1810. Fingers spasmodically extended (25).

Subsultus tendinum, or rather wild movements of hands and arms (56).

Subsultus at wrists (67).

Tonic spasms in fingers (3^a).

Arms fixed (39).

1815. Weakness of l. upper arm (v).

Weakness in arms (xxiii).

No power to raise arms (50).

Paralytic sensation in r. forearm and hand when writing, which went off on stronger movement, but soon returned when writing and when at rest, but slighter (H^1).

Feeling of heaviness in arms, from elbow to fingers; she would like to let them sink down; with feeling of fingers being asleep when she grasps anything (H^2).

1820. Chilliness and insensibility of arms (H).

Chilliness in both arms, esp. l., when walking in open air (v).

Hands icy cold (vi).

Fingers and nose cold and pale like those of a corpse (xxvii).

Tingling in fingers (70, iv^a).

1825. Tingling and numbness in arms (68, xxix).

Numbness and tingling of palms and tips of fingers (44).

Numbness in arms (24, xxx).

Numbness of cheeks and tongue rapidly spreading over shoulders and back and down arms (65).

Hands benumbed, cold, and clenched (39).

1830. One hand becomes icy cold and insensible as if numb, aft. 2 h. (H).

Sensibility of hands diminished (v^a).

Palms insensible, does not feel deep pricks (19).

Formication in r. forearm (v).

Creeping in forearms (v^a).

1835. Creeping in forearms and hands, which are benumbed and heavy (v^a).

Creeping pain in fingers (H).

Creeping in fingers, also when writing (H^4).

Formication with warm feeling in l. index and middle fingers (xii).

Tickling itching on inner side of l. upper arm (v).

1840. Hot palms (vi).

Heat of palms, evening (ii).

Burning and agreeable warm feeling along back of index (v).

His arms are as if bruised and sink powerlessly down (H^2).

Horrible pain in whole arm, esp. in thumb; the arm became bright red, swollen, and the pain so intolerable that he nearly fainted; the arm went on to suppurate, a quantity of pus was discharged—from juice of acon. in a wound (6).

1845. Tearing pain from shoulder down into arm as far as wrist, and even to fingers, almost only on every movement; during the pain the hand is blue, aft. 1, 14 h. (H).

Shooting and prickling in arms and fingers, numbness in shoulders (10).

Tearing and formication in r. arm (xi).

Bruised pain in l. arm (v).

Pain in cervical muscles and shoulder-joint, so that he could not move his arm backwards without great pain (xii).

1850. After sleeping a pain on moving in shoulder- (and hip-) joint, as from being crushed, or as if the bed had been too hard (H).

A swelling in the muscles of shoulder, with violent pains as if bruised, when touched, aft. 4 h. (H).

The shoulder hurts her, and tends to sink down (H^2).

Flying stitches in shoulder- and elbow-joints (xxii).

Slight drawing in r. shoulder, followed by tearing and drawing, with lameness in head of l. humerus, for 2 d. (i).

1855. Acute pressive pain in r. shoulder and r. upper arm (xxiii).

Pain in l. shoulder-joint (H^4).

Continued pressive pain in l. shoulder (v).

Some flying stitches in l. shoulder (H^2).

Flying stitches in l. hand and l. shoulder-joint (xxii).

1860. Tearing in l. shoulder-joint (xi).

Painful drawing in upper and fore arms (xxiii).

Drawing pain r. upper arm, for some days (ii).

Sudden drawing shooting pain in posterior part of r. upper arm (H^1).

Single stitches in middle of r. upper arm on its anterior aspect, when at rest, unaffected by motion and by pressing on it (H^1).

1865. Drawing and paralytic stiffness in outside of r. upper arm (xiv).

Drawing and numb sensation in posterior external aspect of l. upper arm (v).

Pain in elbows on walking relieved by pressure (vii).

Drawing pain in elbow-joint (H^2).

Tearing in elbow (xi, xxix).

1870. Bruised pain in r. elbow-joint (xix).

Pricking as with blunt forceps in several parts of l. arm, near bend of elbow (xxiii).

When she bends fingers down to wrist immediately violent stitches in elbow-joints down to wrist, on external aspect of arm (H^2).

Pain in forearm as from a severe blow (H^2).

In forearm pricks as with fine needles (xxii).

1875. Drawing shooting pain in bones of forearm, excitable by movement (H).

Tearing all through r. forearm, wrist, and fingers (xi).

Drawing tearing pain in external side of r. forearm (H^1).

Acute pain in r. forearm along flexor tendon of little fingers, increased by movement (xxvii).

Tearing in l. forearm, hand and finger (xi).

1880. Penetrating shooting at lower end of inner side of l. forearm (v).

Cramp-like pain in whole l. forearm, not relieved by anything (H^1).

Undulating tearing pain in upper end of left forearm (H^1).

Twitching drawing pain in lower end of inner surface of l. forearm over wrist to palm (H^1).

Great pain in wrists (67, xxix).

1885. Tearing pain in wrist (H).

Drawing paralytic pain in r. wrist-joint (H^6).

Cramp pain in r. hand (H^6).

Cramp-like pain with pricks in r. hand, going off by moving it (H^1).

Some penetrating pricks in right palm as with a sharp needle (H^1).

1890. Morbid contractive pain in l. palm so that he can hardly extend fingers (H^1).

Paralytic pain in thumbs (H^2).

Painful movement of r. thumb-joint as if sprained (H).

Twitching pains in r. thumb (H^1).

Painful drawing in l. thumb (H^6).

1895. Cutting aching pain in side of r. index next middle finger when moving and when at rest (H^1).

Felt as if had lost l. little finger (67).

Cool sweat on palms (H).

Hands and nails slate coloured (68).

Hands blue (xxvii).

1900. Hands and fingers blue (74).

Blue nails (65).

Lower Extremities.

Trembling in legs (ii^a).

Frequent drumming with the feet, said they felt like two heavy weights (52).

Convulsive movements of legs (39).

1905. Cramps and pains in legs (20).

Cramp of calves (16).

Feeling of shortening of tendons in hough (i).

Feeling of shortening of both tendones Achillis; he had a difficulty in standing erect after sitting some time, the knees giving way, for 3 w. (i).

Numb feeling of lower limbs, esp. feet and toes even while walking, so that he must stand still, and the feeling is relieved by moving feet backwards and forwards (xii).

1910. Numbness of legs (64).

Numbness in legs and feet (10).

On going downstairs legs felt numbed and heavy, and gave way under him (70).

The legs in their lower parts and the feet are as if numb and gone asleep (H^2).

Numbness and tingling commencing in feet and spreading quickly upwards (43).

1915. Feet prickling and numb, without feeling (66).

Numbness and tingling of soles (44).

When sitting or standing, lower limbs feel asleep, or as if adherent to the ground, relieved by walking (xii).

Going to sleep of right foot when sitting (xxiii).

Toes of right foot went to sleep when walking (xii).

1920. Could not feel her feet (64).

Weariness in thighs (xxiii).

Weariness of legs, esp. when going upstairs (v).

Transient weariness of legs on commencing to walk (v).

Feeling of great weariness in feet, esp. when sitting (xxvi).

1925. Great weariness of feet (xxvii).

Great exhaustion of limbs increased after walking (xi).

Weakness of legs (43).

Weakness of knees (xix).

Weakness of knees extending over r. thigh and leg (xix).

1930. Excessive weakness of legs, staggering of knees (xii).

After sitting an almost paralytic weakness in thighs and legs (H).

Felt as if legs would give way under him (68).

No power over lower extremities (68).

Unable to walk owing to loss of power over muscles, sensibility of legs impaired (53).

1935. In a few minutes legs became so weak and such a tremor came over her that she could not stand alone (55).

Want of firmness and unsteadiness in knees; the knees totter on standing and walking (H).

Want of firmness of knees, especially of one of them; it gives way when walking, immediately and aft. 1 h. (H).

Legs refused their office (10, 42).

Coldness of legs (vi).

1940. Cold spreading over inside of lower limbs from middle of thighs downwards, esp. on knees and feet (v).

Slight chills over thighs (v).

Cold feet (70, viii).

Coldness of feet, esp. of toes (H^5).

Coldness of feet up to ankles, with perspiration of toes and soles (H).

1945. Stiffness and heaviness of lower extremities, could not walk at his usual pace (xxiii).

R. lower limb very heavy (xxvii).

Legs felt swollen and too heavy to lift (40).

Heaviness of feet, immediately (H).

Feet as heavy as lead when sitting and standing (xii).

1950. Stumbling of legs, feet as heavy as lead, so that he could scarcely walk (xii).

Drawing in tendinous expansion of lower extremities (xxvii).

Drawing pains here and there in l. lower limb (xxvii).

Tottering walk owing to powerlessness and pain in head of femur (H).

In head of l. femur drawing pain when standing or sitting, still more when walking (H^2).

1955. Powerlessness in head of femur, or inability to walk, on account of an indescribable, intolerable pain, almost as if head of femur were crushed, which sometimes declines, sometimes increases, and occurs aft. lying and sleep, aft. 5 h. (H).

After sleeping, pain on moving, in hip- (and shoulder-) joint as from being crushed, or as if the bed had been too hard (H).

Painful pressure in hip-joint when walking (xxvii).

Pain in r. hip, relieved by walking in open air (xii).

Drawing pain in r. hip-joint when moving (xxvi).

1960. Drawing pain in l. hip-joint (xxvi).

Thigh painful to touch as if sore (xxvi).

Burning itching on inside of thighs and round knees (xiii).

Tensive pressure in thighs as from a tightly-drawn bandage, with great exhaustion, when walking (H^5).

Bruised pain in middle of thighs and unusual coldness of feet, felt even in room and when walking (v).

1965. Momentary drawing along thighs (vi).

Drawing on inner side of both thighs, esp. when walking (xxvi).

Fine needle-pricks in muscles of thighs (H^2).

Violent tearing alternately in both thighs (xi).

Drawing pain in r. thigh (xxvi).

1970. Long continued discomfort in knees, esp. l., as after long stooping (vi).

Both knees icy cold, evening, with occasional stitches in them (xxv).

On walking pain in knees and hip-joints, relieved by pressure (vii).

Drawing in both knees (xxv).

Tearing stitches in r. knee-joint (xxii).

1975. Deep slow stitches over r. knee (H^2).

When walking a tearing in r. knee and thigh (xxiv).

Stitches in l. knee (xix).

Drawing shooting in l. knee-joint (xii).

Sudden tearing in l. knee-joint (xi).

1980. Twitching tearing on internal side of knees (H^2).

Pressive pain in patella (xxiii).

Pressive pain in patella and tendo Achillis (xxiii).

Aching and gnawing pain in patella (xxiii).

Bruised pain in l. patella (i).

1985. Acute pressing pain alternately in l. patella, r. tendo Achillis and dorsum of l. foot when walking in open air (xxiii).

Tension in l. patella (xiii).

Tension first in l. then in r. patella that rendered going down-stairs difficult (xiii).

Stitches in l. patella (xii).

Paralytic drawing in legs (ix).

1990. Painful drawing in leg from knee to heel and back again (H^2).

Heaviness and tension in calves (xxvii).

Tension and pain in r. calf (xxvii).

Pain in calf as after severe cramp (xix).

Drawing pain in r. tendo Achillis (xxvi).

1995. Paralytic drawing in r. leg and tendo Achillis to heel (H^2).

Sensation in ankles as if they were constricted by a bandage, in the morning (H).

Horrible pain in ankles relieved by external compression, aft. 7 h. (H).

Pain in ankle-joints, with depressing thoughts and reflections on death (H).

Drawing about ankle (xxvii).

2000. Tearing pain upwards in l. outer ankle, aft. 14 h. (H^1).

Burning pains in r. foot (xxvii).

Feeling of pressure in r. instep (v).

When standing, a long drawn-out violent stitch in l. heel, which spread up in direction of tendo Achillis to hough, recurred 10 or 12 times, and at last became so violent that he must sit down, when it went off (xxii).

Pain in r. heel, esp. when treading (xix).

2005. *P. m.* Gastrocnemii muscles contracted into a ball, as in cramp (34).

Limbs.

Trembling and creeping, with shooting pains, in limbs, aft. ½ h. (12).

Limbs felt too short (xvi).

Involuntary stretching out of limbs (iv).

Sensation of dislocation of extremities (iv).

2010. Slight distortion of limbs (xvii).

Limbs violently convulsed (48).

R. leg and hand convulsed every 2 or 3 m. (47).

Twitching and spasms of limbs (70).

Violent twitching of extremities on going to sleep, which wake him (i).

2015. Twitchings in the tendons so that he could scarcely walk across the room (7).

Twitching of fingers and toes (30).

Cramps in legs and arms (52).

Peculiar sensation in limbs (33).

Arms and legs benumbed (51).

2020. Benumbed feeling of upper and lower extremities (55, 60).

Numb feeling of extremities, relieved by walking (xii).

Numbness in thigh and arm (v).

Numbness and weight in extremities, which are very cold, and he could not raise them from the ground (52).

Numbness and tingling of limbs (73).

2025. Dreadful benumbed tingling in legs and arms (55).

Prickling and numbness in limbs (67).

Tips of fingers and toes as if numb (xxvii).

Tingling in legs and arms (63).

Tingling heat, esp. of extremities (7).

2030. Creeping sensation down both arms and thighs (29).

Formicating sensation in tips of fingers and toes (iv).

Prickling in limbs (41).

Limbs cold (12, 23, 42).

Cold extremities (56, 67, 71, 72, 73, 74, 3[a], vi).

2035. Extremities icy cold (55).

Hands and feet cold (24, 30, 43, 57).

Feet and hands icy cold (viii).

Hands and feet cold and clammy (52).

Weakness in knees and r. shoulder-joint (xix).

2040. Weakness in r. knee and l. elbow-joint (xix).

Weakness and laxity of ligaments of all joints, aft. 46 h. (H).

Prostration of limbs (xv).

Weariness in limbs, esp. in feet, with constant sleepiness and crossness (H).

Sensation of looseness or ligaments of joints, causing unsteady gait (xxii).

2045. Limbs flaccid (31).

Extreme relaxation of limbs (50).

Unsteadiness in joints, esp. knees and feet (7).

One leg and one arm paralysed (i).

Paralytic feeling in l. arm and leg, with impossibility of moving them, when l. side was relieved the same occurred in r. side (3).

2050. Loss of power and sensation in limbs, sharp pinches produced no impression (50).

Painful heaviness in limbs (iii).

Heaviness and weariness of limbs (xii).

Heaviness and stiffness of limbs (xxiii).

Bruised feeling in limbs (xxii).

2055. Drawing in knees, calves, and elbows (xxv).

Drawing here and there in joints (xxvi).

Shooting and drawing in both tibiæ and arms (v).

Tearing in r. upper arm and and r. upper thigh (xi).

Tearing in r. upper elbow-joint and r. knee-joint (xi).

2060. Violent tearing in r. knee-joint and r. forearm (xi).

Sudden slight prickling in fingers and toes (xii).

Single stitches in legs and arms (xix).

Flying stitches in back of hand and dorsum of foot (xvi).

Flying stitches in l. patella and l. shoulder-joint (xxii).

2065. Pain in joints (i).

Tearing stitches in almost all joints, quickly changing, but very acute (xxii).

Cracking of joints during fits (19).

Painless cracking of all joints, esp. knees (H).

Patchy spots and discoloration on limbs (31).

2070. Blueness of finger- and toe-nails (16).

Post-mortem appearances.

Blueness of finger- and toe-nails (15).

Toes contracted (15).

No rigor mortis in upper, slight in lower extremities (35).

Skin.

Skin pale and cold (3^a).

2075. Skin of marble colour (3^a).

Skin dusky (57).

Skin and eyes yellow, jaundice (9).

Jaundice (H).

Red spots on skin like punctures (ii^a).

2080. Fleabite-like spots on hands, face, &c. (H., xxix).

Here and there papules the size of millet-seeds, their apices filled with yellowish lymph and dried (xxiii).

Small red papules and vesicles filled with serous fluid on lower extremities, very painful (vii).

Discrete itching vesicles, size of pin's head on face, forehead, nape and other parts, for a fortnight, repeatedly desiccating, scaling off, and then disappearing (vi).

Many heat vesicles on forehead, very painful (xxiv).

2085. Eruption of vesicles on both temples (i).

Eruption of red pimples on flexor side of thumb, index and middle fingers, painful when pressed (xix).

Itching pimples on upper lip, aft. 24 h. (H).

Skin cold, dry, harsh (iv).

Skin dry (xvii, xxix).

2090. Feeling of dry heat and tightness of skin all over body (43).

The skin, esp. of hands, seems more smooth and elastic (xxvii).

As if epidermis were separated by a thin layer from skin (xxvii).

General numbness and creeping in skin ($22\frac{1}{2}$).

Numbness of skin succeeded by hyperæsthesia (65).

2095. Creeping and crawling all over body (xxvii).

Crawling as from ants over back, upper arms and thighs (xxvii).

Crawling and biting all over skin, as from fleas, most felt in hairy parts, with exception of scalp, causing him to scratch (xxvii).

Formication, esp. betwixt shoulders and down back (xxvii).

Formication, itching and desquamation of skin, esp. in affected parts (H).

2100. Itching in skin (vii).

Frequent transient itching, prickling, burning, scratching here and there in skin (xxiii).

Itching in various muscular parts, esp. forearms and thighs, as though he had hold of the conductors of electro-magnetic apparatus (xxiii).

Continual itching and smarting on various parts of skin, compelling scratching (xxiii).

Prickly sensation over skin (63).

2105. Fine needle pricks here and there on body (H^2).

Fine pricking or pricking burning pain in skin, on various parts of body, accompanied by a feeling of heaviness or swelling (v).

Single long-continued stitches here and there mingled with sore feeling, at length ending in pure sore pain (H).

Generalities.

Felt as if swelling (75).

Feeling of swelling, beginning in face and gradually spreading almost all over body, esp. l. side, accompanied by many painful sensations, as bruised pain of muscles, bruised feeling and pressure in bones, sometimes in one or other rib, sometimes in l. arm (v).

2110. Sensibility diminished (iv).

Sensibility of body much impaired (18).

Sensibility greatly impaired where liniment was applied (61).

Sensibility of touch diminished so that he could not distinguish small objects by touch (vii).

Sensibility diminished, esp. in hands and cheeks (v^a).

2115. Insensibility of legs, arms, and face (42).

Tossing about in bed screaming with pain (31).

Shivering and numbness (64).

Shaking all over, but said he was warm (63).

Horripilation all over body (xvii).

2120. Trembling (69, 71).

Trembling when walking (19).

Tremulous and giddy (32, xxix).

Excessive trembling (17).

Anxious trembling like vertigo, boiling and simmering through body, as if hands and feet would go to sleep, accompanied by cold feeling (xii).

2125. Complained that all the vessels in his body grew stiff (3, xxx).

A rigid state of muscles brought on by attempting to grasp anything (74).

Alternate relaxation and spasm of muscular system (56).

Trembling ending in convulsions (12).

Slight muscular twitchings (49).

2130. Twitchings and spasms all over body, esp. face (2^a).

Spasmodic twitchings in different parts, esp. fingers (25).

Subsultus tendinum (iv).

Cramps ($22\frac{1}{2}$).

Violent spasms (41).

2135. Tonic spasms (68).

Clonic convulsions all over body (3^a).

Convulsions (48, 54, 71, 2^a).

General convulsions (14, 15, 25, 30, 36, 43, 73).

Convulsions, eyes turned up under lids, fists pressed against chest, teeth fast closed, thick frothy saliva between lips (10).

2140. Convulsions, up. and low. extremities drawn inwards, fingers and thumb drawn inwards, fist cannot be opened, legs adducted (19).

Had repeated paroxysms at intervals of 20 m., each fit lasted several minutes, was ushered in by a shuddering noise, the arms became rigid or were raised above head, which was thrown back, and lower limbs extended rigidly (54).

Tetanus (39).

Opisthotonos (14, 39).

Great malaise (2^a, iii, xxvii, v^a).

2145. Feeling as if just recovering from a serious disease, and had risen from a sick bed, aft. 6, 12 h. (H).

Feeling of extreme illness (38).

General ill feeling (15).

Pale, emaciated, his gait and whole appearance betokened illness (i).

Muscular movements difficult (23).

2150. Walking and speaking tire him (ii).

Fatigue when walking, esp. upstairs (xxii).

Fatigue as after a long walk in thighs and forearms (xxiii).

Disinclined for movement, prefers to sit (H^2).

Morning on waking such great weariness that he did not like to get out of bed, which, however, went off after getting up (H).

2155. Weariness (xiii, xxiv).

Languid and sleepy (iii^a).

She must lie down, between 3rd and 5th h. (H).

Irresistible inclination to lie down, from 2 to 5 h. (H).

Deathly lassitude (3^a).

2160. Weakness (67, v^a).

Great weakness (1, 39, 59, 71, 74, 2^a, xxvii).

Weakness of muscles (ii^a, v^a).

Weakness and laxity of ligaments of all joints, aft. 46 h. (H).

Great weakness and inability to stand (29).

2165. Paralytic weakness (15).

Rapid sinking of strength (16).

Sensation of sinking (67).

Relaxation of limbs, muscular exertion attended by great fatigue and prostration, and by increase of pain in head and face (i^a).

On walking, weariness, and on continuing to walk pain in calves, knees, and hip-joints (vii).

2170. Frequent attacks — about every other hour—for ¼ of an hour at a time of the most extreme weakness and insensibility so that he can move neither hands nor feet, nor sit up in bed, nor yet feel his former pains, nor see, hear or speak aloud, the legs at same time are extended, aft. a few h. (H).

Exhaustion (ii, iv, v, vii, ix, xiii, xxii, xxiii, xxv).

Exhaustion on waking (ix).

Exhaustion, relieved in open air (ix).

So exhausted, could not stand, must remain lying (iv).

2175. Exhaustion and weariness (iv).

Exhaustion and weakness (ii[a]).

Greatly exhausted, any exertion caused prostration with quick and shallow breathing, and diminished impulse of heart (63).

Great prostration (2, 7, 21, 23, 26, 36, 63, 68, 71, iv, ix, xii, xvi, xvii, xix, xxiii, xxvii, xxix, v[a]).

Prostration, evening (ii).

2180. Prostration on raising head (57).

Prostration, sense of languor, oppression, and weight (43).

Heavy gait (v[a]).

Unable to walk or stand without great effort (iv[a]).

Inability to walk (24).

2185. Unable to walk owing to loss of power over muscles (53).

Inability to stand or move (67).

Could not stand upright, aft. 2½ h. (19).

Loses sense of stability, feels as if feet would rise up (xxvii).

Would have fallen if not supported (2).

2190. Muscles and ligaments so relaxed, could not stand or sit without support (45).

Muscular system so much relaxed, could hardly stand or walk (44).

Fell back on seat from weakness (63, xxviii).

Fell down at bottom of stairs (70).

Legs refused their office, fell down (10).

2195. Felt like to faint (ix).

Faintness (19, 34, 44).

Extreme depression and faintness (40).

Collapse (23, 31, 35, 54, 55, 58, 64, 70, i[a]).

Fainted 3 or 4 times on trying to sit up (55).

2200. Syncope (H, 2, 6, 7, 13, 17, 22½, 33, 50, 58, 64, xvii, xxix).

Got out of bed, but was so paralysed could not get in again without help (38).

Very exhausted, as if paralysed (2[a]).

General paralysis (28).

Paralytic sensation and bruisedness in arms and legs, with violent trembling all over body, esp. of extremities, owing to which he can hardly walk or step; at same time excessively pale face, dilated pupils, faintness, palpitation of heart, cold sweat on back, and bursting headache in temple, soon followed by burning heat in face, with feeling of tension and redness of face, sleepiness aft. dinner, aft. 46 h. (H[2]).

2205. Heaviness as of lead all over body (2[a], 3[a]).

Discomfort through whole body (xxvii).

All over body sensation as when in a vapour bath the steam falls rapidly down on the skin, and drops are felt on it (xxvii).

Body felt dry and as if he had been wasted (63).

Tingling sensations through whole body (51).

2210. Tingling through whole flesh (22, 22½).

Tingling in fingers extended all over body with numb feeling (70).

Tingling heat spread all over body, esp. extremities (7).

Glowing tingling feeling over body (iii[a]).

Tingling pricking sensation running up legs to spine and head (iv[a]).

2215. Tingling and numbness all over body, except legs (53).

Numb sensation all over body (xii).

Numbness and tingling commencing in feet and spreading quickly upwards (43).

Numbness and tingling (70).

Numbness, tingling, muscular weakness (71).

2220. Numbness (56, 66, 67).

Numbness commencing at toes, crept gradually upwards till whole body was affected by it (49).

Formication (27, iv).

Peculiar formicating sensation on tongue spreading over lips, back parts of mouth, fauces, tips of fingers and toes, face, and then all over body (iv).

Formication first in tongue and lips, then in face, spreading all over body (vii).

2225. On the parts where the formication had been occurs a furry feeling as in a finger tightly tied with a thread (iv).

Great dryness of all the body, and burning itching, esp. in inner side of thigh, and round knees, that did not permit a moment's rest (xiii).

Prickling and electric shocks throughout body (33).

Prickling and numbness in trunk and limbs (67).

Apparently suffering pain and anxiety (58).

2230. Severe pains (41).

Violent headache and faceache, spreading all over body (vii).

The whole body is painful to touch, the child will not allow itself to be taken hold of, it whines (H).

Felt as if all the body were ulcerated (2).

Great muscular soreness, movements of body painful (71).

2235. Bruised pain in various parts of body (v).

Constriction of body (iv).

Painful drawing here and there (xxiii).

Drawing pains in whole body, esp. in joints of lower extremities (xxvii).

Drawing pains wandering about, now in nape, now in liver, then in bowels, then in groin, then in some joint, always changing quickly, never more than a few minutes in one place (xxvii).

2240. Painful sensations of pricking, aching, pressing, gnawing in different parts of body not unlike those caused by electromagnetic apparatus (xxiii).

Stitches in forehead, back, sides of chest, fingers, back of hand and lower parts of body, as though he stood on insulating stool of electric machine and sparks were drawn from him (xxiii).

Transient stitches here and there in ribs, abdominal integuments and joints (xxvii).

Lancinating pains in various parts, particularly joints (71).

Painless cracking of all joints, esp. of knees (H).

2245. Made a horrid noise as if in a fit (54).

Hysterical (70).

Dread of being shaken when driving (i).

Great desire for cool air, which gave relief (48, xxx).

In open air head is free and all symptoms ameliorated (H^2).

2250. Many symptoms occur when entering the room and go off when walking in open air (v).

Better in equable temperature, but symptoms increased on coming from cold into heat and vice versâ (iv).

Wine and coffee usually removed symptoms (xxiii).

P. m. Rigor mortis strong (34, 50, 58, 73).

Muscles bright red (4^a).

THERAPEUTIC USES OF ACONITE.

THE therapeutic uses of aconite are clearly indicated in its pathogenetic effects. Before Hahnemann, but little use had been made of it as a remedial agent, but after he, with rare intuitive perception, had, from his experiments on himself and a few disciples, indicated its sphere of action, its therapeutic virtues were tested and acknowledged by numerous observers of both schools. The records of its remedial employment are, we may say, co-extensive with those of its pathogenetic effects, which can hardly be said of any other drug in the materia medica. It would occupy more space than we could afford to give minute details of all the affections in which it has proved curative, so I must content myself by giving a mere summary of the morbid states, and the maladies in which it has been proved serviceable.

Fever.—Hahnemann (*Mat. Med. Pura*, i, p. 25) says that it is specific in those acute inflammatory fevers in which allopathy used to recommend venesection, and the experience of all his disciples and o many observers of the old school, confirms this statement. Besides inflammatory fever, the attendant of inflammatory affections of varying seat, it has proved serviceable in catarrhal and rheumatic fever sometimes as the sole remedy, sometimes in alternation with other medicines corresponding to the specific character. It is seldom indicated in the fevers resulting from morbid poisons such as typhoid, typhus, relapsing fever, malarious fever of pyæmia and septicæmia. It is, however, useful in the fever of measles, purple-rash and scarlatina, when not of an asthenic type. It is said to have proved curative in the plague, and Holcombe says that he proved it, in alternation with belladonna, specific in the first stage of yellow fever. It has been employed advantageously in true gastric fever when the mucous membrane of the stomach is in a high state of irritation. Here it is homœopathic to the local affection as well as to the general febrile state. It is seldom of use in the hectic fever of phthisis.

Head.—In addition to the cephalic pains accompanying the febrile state, aconite is curative of some idiopathic head affections. It has been successfully employed in congestions, in sanguineous apoplexy, in encephalitis, meningitis and hydrocephalus acutus, sometimes alone, more often previous to or in alternation with the employment of belladonna, or some other cephalic remedy. The psychopathic states in which it has been used with advantage are the effects of fear and fright. In febrile states distinguished by anxious impatience, restlessness and agonized tossing about, it is specially indicated. It is invaluable in the hyperæmic conditions of sufferers from mental diseases. The cephalalgia

in which it is indicated, according to Hering, is distinguished by the most violent pains of a throbbing and shooting character, when the patient lies half unconscious, moaning, fears he will die, cannot bear the least noise or movement, the pulse being small and intermittent. Also in migraine when the pain is above one eye of a violent shooting or boring character, accompanied by nausea and vomiting, and aggravated by any movement. According to Black it is indicated in congestive headache, when there is a feeling of fulness and tension, as if a band were tightly compressing the head.

Eyes.—In inflammations from a traumatic cause, and especially after operations on the eye, aconite has been found very useful. It has also been found serviceable in catarrhal conjunctivitis, in ophthalmia blennorrhœica, and ophthalmia neonatorum. Ophthalmia rheumatica and arthritica have been cured by it alone. According to Dekeersmaecker it is invaluable in acute glaucoma.

Ears.—Bayes has found it successful in otitis. I have often found it remove the most severe otalgia, especially in children.

Nose.—In epistaxis attending congestion to the head, and that form of epistaxis occurring in women at the climacteric period, it has rendered good service.

Face.—In prosopalgia affecting the trigeminal nerve and its branches aconite and its alkaloid have been much and successfully employed by old-school practitioners chiefly as an external remedy. Gübler says he has never known a neuralgia of the fifth pair resist the administration of aconitine. I myself have seen the most violent neuralgias of the supra-orbital and facial branches of that nerve rapidly removed by the internal administration of aconite.

Teeth.—The toothache in which aconite has been efficacious is the congested form of severe throbbing pain almost driving the patient mad, accompanied by red burning face.

Throat.—In cynanche tonsillaris aconite has been frequently used with success in both schools. Ringer says: "A quinsy or sorethroat, if caught at the commencement, rarely fails to succumb in twenty-four to forty-eight hours." Goullon says it is indicated especially in the rheumatic form, which is chiefly located on the uvula and velum palati, but it is also useful in pure tonsillitis.

Stomach.—As aconite causes extreme gastric irritation and pain with violent vomiting, so it has been found curative in similar morbid states, especially when caused by a chill. The gastroses in which it is particularly indicated are usually attended by fever and intense thirst.

Abdomen.—Acute enteritis has been cured by aconite in both schools. Hartmann considers it a true specific in this disease. Kreussler recommends it in inflammation of the diaphragm, and several cases are recorded of peritonitis cured by it. It has also been successfully used in incarcerated hernia with inflammatory symptoms. The febrile states accompanying helminthiasis are best met by aconite. It has also been frequently employed with success in hepatitis and jaundice, sometimes as the sole remedy, sometimes in alternation with other hepatic remedies. According to Hartmann and Hering it is useful in dysentery accompanied by rigors, heat and thirst, with tearing pains in the limbs, head,

and nape. It has cured cases of sporadic cholera produced by dietetic errors and chills; also in the congestive states following the reaction in Asiatic cholera. Paterson found it efficacious in the suppression of the urinary secretion in cholera. Madden found it indispensable in the cholera infantum in Australia. Hempel and Cramoisy found it useful in the sudden collapse of cholera. Hartmann recommends it in fluent hæmorrhoids, with shooting and tension in anus.

Urinary Organs.—In the febrile state accompanying cystitis, aconite is indispensable. Hering recommends it in painful urging to urinate, with red urine and pain in the bladder. Ringer says: "the acute stage of gonorrhœa may be satisfactorily treated by a drop of tincture of aconite each hour; and it is even said to remove chordee," and the experience of homœopathic practitioners corroborates this. In the fever produced by passing a catheter it is specific.

Male Genitals.—Its pathogenesis bespeaks its utility in acute orchitis.

Female Genitals.—Though not so useful as belladonna in metritis, it has been employed with advantage in the accompanying fever and pains. Hughes says: "In suppression of the menses from a chill, with its accompanying congestive phenomena, there is no more valuable medicine;" and Ringer agrees with him in this.

Respiratory Organs.—Catarrhal fever and influenza are frequently cured by aconite. Hahnemann says it is the main remedy in croup, and many brilliant cures of this disease have been effected by his followers. Ringer's praise of it in this affection is enthusiastic. He says: "Its effects on catarrhal croup, or as it is sometimes termed spasmodic laryngitis, are just as conspicuous. It removes the urgent dyspnœa in a few hours, and in a short time longer subdues the fever, so that an attack usually lasting three or four days is almost extinguished in a few hours. It apparently checks spasms and croupous breathing, when there is little or no fever, and in those rarer cases when these symptoms continue after the subsidence of the fever. Aconite is equally serviceable in severe colds, with much chilliness and great aching of the limbs, a hot dry skin, and quick pulse." Bronchitis and tracheitis have often been cured by it. It is particularly serviceable in the bronchitis of children and in the inflammatory affections of the respiratory organs in measles. In the earlier stages of pneumonia it is a most valuable remedy. Many cases of acute pleurisy, especially of the plastic sort, have been cured by it alone. It is useful in the early stages of phthisis.

Heart.—No medicine is more valuable than aconite in inflammatory affections of the heart, as carditis and pericarditis, and the experience of Ringer is in favour of its value in the latter. In the cardiac complications of rheumatism it is the chief remedy. It is also useful in all diseases of the heart characterised by increased action, as Hughes has well observed. In spasm of the heart and violent palpitation it is truly specific. It is in the sthenic forms of heart disease that its curative power is displayed. It is not suitable when there is great weakness of the heart's action.

Back.—It is curative in stiffneck and lumbago, the result of a chill, particularly when these states are attended by fever.

Limbs.—Acute attacks of rheumatism localised especially on the joints are relieved and even cured by aconite alone. Attacks of gout have also been successfully treated by it; it is specially indicated by the febrile restlessness and irritability that accompany this affection.

Skin.—Aconite has long been a favourite remedy in erysipelas, and its value in this disease was testified to by Liston. I have already mentioned its value in measles and some forms of scarlatina.

Convulsions.—Aconite has been successfully employed in traumatic tetanus. It would also seem to be of use in idiopathic tetanus from exposure to wet and cold. Trismus also from similar exciting causes falls within the range of its curative action.

Neuralgia.—I have already spoken of its value in prosopalgia, and it has been successfully used in sciatica, especially that form of it depending on inflammation of the sheath of the nerve. Turnbull records a case of agonising neuralgia of the fingers cured by tinct. of aconite and aconitine ointment. Garrod also recommends it in neuralgia.

The short duration of the action of aconite even in cases where poisonous doses have been swallowed, would seem to show that it is chiefly in acute diseases that we must look to obtaining the best results, but Hahnemann assures us that it is "an indispensable accessory remedy in even the most obstinate chronic affections, when the system requires a diminution of the so-called tension of the blood-vessels."

Clinical Record of Aconite Cures.

The subjoined reference to cases where aconite has been found curative may be of use. They are chiefly taken from Noack and Trinks' *Materia Medica,* with numerous additions by myself.

Diseases of stout and full-blooded children. (Widnmann, *A. h. Z.*, xxii, p. 107.) Glandular swellings (Stœrck, Greding, *op. cit.*) Very painful rheumatism of the joints, with violent fever; stitches in the chest; violent, quick, and wide extended heart's beats. T. acon. gtt. v, twice a day, cured it in four days. (Kramer, *Hyg.*, x, 505.) Rheumatismus acutus febrilis. (Frank, *A. h. Z.*, xxi, 290.) Aconite is suitable only for that form of febrile rheumatism where the genius morbi or the individuality tends to the true synochal-inflammatory diathesis. (Kurtz, *A. h. Z.*, xxvi, p. 89.) Rheumatismus acutus articulorum; tearing and shooting in the limbs, which were swollen; moderate inflammatory fever, increasing towards evening; thirst; anorexia. T. acon., gtt. iv, in aq. ℥iij, a tablespoonful every three hours. (Werber, *Hyg.*, viii, 294.) Chronic rheumatic gout, when the patients have been made weak and irritable by abuse of medicine, so that they cannot bear the smallest doses of homœopathic medicines without aggravation of the sufferings. In some cases the chronic affections changed into acute, and a true irritation fever was stirred up; in those cases aconite moderated the pains and the debilitating perspirations, and procured sleep, by means of which the patients recovered and were cured by the employment of other appropriate medicines. (Arnold, *Hyg.*, i, 64.) Acute arthritis, affecting all the

joints, with fever. (HEICHELHEIM, *Hyg.*, v, 206.) Rheumatic fever. (GRIESSELICH, *Hyg.*, iv, 129; WERBER, *ib.*, viii, 294; ROTHANSL, *ib.*, xviii, 467; WURMB, *Klin. St.*, 230; HENCKE, *Allg. h. Z.*, lv, 167; KAFKA, *Prag. M. S.*, i, 55, 186; FLEMING, *Inq. into Phys. and Med. Prop. of Acon.*, 115—128; LABORDE et DUQUESNIL, *Des Aconits*, 294). Arthritic fever. (KRAMER, *Hyg.*, i, 18.) Frightful pains in the joints that would not allow the slightest touch, with strong fever. Acon. 4, gtt. j, twice a day, cured in seven days. (HEICHELHEIM, *Hyg.*, v, 206.)

Very violent ebullitions of blood, with great redness of face, anxiety and restlessness; after which inflammation of important parts used to occur; cured by a few doses of acon. 12. (STAPF, *Arch.*, ii, 3, 84.) Congestions: rush of blood to the head, with constant vertigo, causing falling; severe headache; stupefying pains in the forehead; confusion; momentary loss of consciousness; flickering before the eyes; in two strong plethoric men who used formerly to be bled several times a year. (KRAMER, *Hyg.*, i, 24.) Excessive perspiration. (I. GOURBEYRE, *Gaz. Med.*, 21, 1855.) Erysipelas. (LISTON, *Elem. of Surg.*, 61; FLEMING, *l.c.* 76.)

Nervous over-excitement in acute diseases, with attacks of weakness and faintness. (HARTMANN, *On Aconite.*) Attacks of illness after fright, in a delicate, weak-nerved girl of 10 years. (HEICHELHEIM, *Hyg.*, v, p. 207.) Convulsive attack recurring every evening at eight o'clock, and lasting three hours: crying out for help, pale face, loss of voice soon afterwards, alternate tonic and clonic spasms of all the limbs, then all at once springing up like lightning (an ecstatic state), fearful cries and bellowing, eyes fixed and wide open, eyelids immovable, angry movements, with inflamed countenance and many imposing earnest attitudes, alternating with sardonic laughter and trismus; movements so violent that four men could not hold her, towards the end quiet sleep; on awaking no recollection of what had happened; before the attack burning in the heart and severe stitches in the chest, whereupon loss of consciousness ensued: in a girl of 18 years of age. After fruitless employment of cicuta, cured by acon. 30, three doses. (SCUDERI, *Hyg.*, vi, 473.)

Scarlatina. (MÜLLER, *Arch.*, iii, 1, 34; KÄSEMANN, *Hyg.*, v, 22.) Diminished the severity of the symptoms of scarlet fever, shortened its duration, and when given as a prophylactic appeared to have the effect of rendering mild the subsequent disease. (MÜLLER, *Arch.*, i, 8.) Measles in a girl 12 years old: skin burning hot, pulse hard, very quick, great anxiety, breath hot, short, very much oppressed respiration, dry, metallic-sounding, barking, very troublesome cough, painfulness of the throat along the trachea on being touched, great thirst, with painful swallowing, extraordinary photophobia, with excessively red conjunctiva and constant lachrymation. (WATZKE, *Œst. Zeitsch.*, i, 2, p. 236, acon. 1 every quarter of an hour.) Measles; the skin was cool, covered with sweat, the face and whole body pale, the pulse thread-like, uncountable; breath short, rapid, panting; constant groaning and lamenting; automatic motion of the left hand, with which she frequently hit herself in the face; jerkings with the left leg,

frequent grinding of the teeth, the eyelids fast stuck together, nostrils stopped up with brown crusts: in a scrofulous girl 1½ years old, in whom the eruption disappeared several times from the skin. Acon. 3 every five minutes brought the exanthema again upon the skin, and cured the other nervous symptoms. (WATZKE, *l. c.*, p. 237.) Measles, with predominant affection of the fauces and bronchi, also irritation of the intestines; diarrhœa of fermented-like, greenish, frothy and clayey stools; interstitial erythema between exanthematous patches. (HARTMANN, *Acute Dis.*, i, 299.) Epidemic of measles; as chief and in many cases sole remedy. (OZANNE, *B. J. of Hom.*, vi, p. 61.) Measles. (HEICHELHEIM, *Hyg.*, iv, p. 423; TIETZE, *Ann.*, ii, 232.) Miliaria puerperalis. (HARTMANN, *Aconite*, p. 22.) Intermittent fever; when the quotidian (as frequently happens with children) approaches synocha in character, or when, independent of the type, the accompanying symptoms indicate aconite. (GERSTEL, *Œst. Ztsch.*, i.) Intermittent fever in children; in whom the heat was the predominant symptom of the fit, and the disease was recent: acon. 24, repet. (SCHWAB, *Hyg.*, i, 76.) Intermittent fever that resisted all ordinary remedies, even sulphate of quinine in large doses, was soon cured by acon. 3, given shortly before and during the attack. (EVERARD, *Hom. Viert.*, i, p. 289.) Inrermittent fever in a very plethoric patient, with extreme anxiety and oppression. (HAUBOLD, *Allg. h. Z.*, i, 146.) Intermittent fever, with pain in head, nape, and back. (SCHWEIKERT, *Allg. h. Z.*, xxxvii, 325.) Intermittent fever, with anticipatory fits, pain in head, stiff nape. (*Ib.*) Indispensable remedy, where to the primary affection of a single system or organ a general febrile disturbance has associated itself, which is distinguished by a preliminary intense rigor, followed by local or general heat, generally lasting long; by hot, dry, more or less red skin, which feels burning to the touch, rapid, full pulse, headache, sparkling eyes, violent continued thirst, anorexia, fiery urine, prostration, deliria of more or less severity, with well-marked remissions and paroxysms. (SCHROEN, *Hyg.*, v, 98.) Ephemera, irritation fever, without local affection, especially in children. (GOULLON, *Arch.*, xix, 2, 8.) Aconite not only supplies the place of the whole antiphlogistic apparatus, bleedings, neutral salts, mercurials and fomentations, but is much superior to them in certainty and innocuousness. (SCHROEN, *l. c.*, 97). Synocha in a full-blooded girl of robust constitution: excessive general heat, glowing red hot face, febrile rigor, oppression of chest, dyspnœa, violent delirium, hard, full, slow pulse; cured by the 30th dil. in eighteen hours. (TIETZE, *A. h. Z.*, iii, 115.) Synocha, with rheumatic gastric affections: fantastic visions, heaviness of head, pressing out at forehead and temples, painful drawing in the hair, stiffness of the nape, tense feeling on face, which is red and turgid, painfulness of the eyes, which are red and inflamed; oppressed breathing, with full feeling in the chest; frequent stitches through the left side of the chest, inclination to vomit, tension in the hypochondria, distension and rumbling in the abdomen, pains in the limbs, sacrum, and back, diarrhœic stools, burning hot skin, rigor over the body in the morning, febrile pulse, anxious hurried speech: in a man, 46 years old, after a chill and vexation; cured by two doses of acon. 18. (MESSERSCHMIDT, *Arch.*, v, 2, 49.) Specific

in the synocha or pure inflammatory fever in which the fibrine of the blood is in excess (so that the clot would be buffed and cupped) while the corpuscles are unpoisoned and the tissues yet intact. (HUGHES, *Pharmacod.*, 155.) Inflammatory fever. (LOMBARD, *Gaz. Med.*, Oct., 1835.) Violent inflammatory fever of children, with twitchings, starting and connected convulsions. (GOULLON, *Arch.*, xix, i, 38.) Synochal fever: constant restlessness, complete sleeplessness, constant sobbing sighs, interrupted by starts; refusal of the breast, but drinking of much sugared water: in a new-born infant; cured with one dose of acon. 24. (BIGEL, *Arch.*, iv, 3, 42.) All fevers, continued and intermittent. (CERIOLI, *Dell'uso dell' Acon.*) Phlegmonous inflammations, where the arterial system is chiefly involved. (HEICHELHEIM, *Hyg.*, v, p. 203.) Its power over inflammation is little less than marvellous. (RINGER, *Therap.*, 7th edit.) Traumatic fever and pains after surgical operations, especially of the eyes, and when, after forcible delivery by instruments, there comes on inflammatory fever, with shooting pains in uterus, and great restlessness. It also prevents traumatic fever after amputations of the limbs and breast, and takes away the pain. (WUERZLER, *A. h. Z.*, xxi, 6.) Puerperal fever: shooting, cutting pain in the swollen abdomen, increased by motion and pressure; diminution of the lochia and of the milk, sparkling eyes, much thirst, not very full, rapid pulse, hot skin, excessive restlessness, anxiety, with fear of death, complete sleeplessness, with deliria. (SCHROEN, *Hyg.*, v, 100.) Dentition fever of children. (KRAMER, *Hyg.*, i, 19.) Vermicular fever. (MALY, *Hyg.*, xviii, 50.)

Typhus, with great heat, inflammatory state of the organs of the chest and abdomen. Acon. 8 in repeated doses. (STRECKER, *A. h. Z.*, xvi, 277.) Typhus, with great excitation in the arterial system and swelling of the parotid and in pleurisy. (BAERTL, *Arch.*, xx, 3, 94.) Typhus, with the symptoms of an inflammatory fever. (BOSCH, *Hyg.*, xxx, 4.) Typhoid. (DESHAGES, *Du trait. de la fièvre typhoide par l'Aconit.*) Profuse, unalleviating, debilitating sweats in rheumatic gouty affections. (ARNOLD, *Hyg.*, i, 65.)

Fixed idea of impending death in a pregnant woman, who, on the ninth day after delivery, got violent congestion of blood in the chest and extraordinary oppression of the chest, so that she was like to be choked, with intermitting pulse, cold, clammy sweat; she took leave of her relations, raved about the speedy occurrence of death, and pointed with an air of great anxiety to her heart. In a woman, aged 20, who had already had one child; complete cure after one dose of acon. 30. (GROSS, *Arch.*, vii, 3, 43.) In a woman, aged 22, first pregnancy: sadness, laconism, complete joylessness and dejection, everything affects her to tears, expectation of certain death during delivery. After delivery: metrorrhagia, of which she fully expected to die, cold sweat, anxiety, loss of consciousness, convulsions of the arms. One dose of acon. 24 cured her completely. (BETHMANN, *Arch.*, ix, 1, 115.) In a girl of 18 fear that she would die on a fixed day, caused by a prophecy. Alternate laughing and weeping delirium. In the night tossing about in bed, climbing up the wall, endeavours to run away. By day as if deaf and dumb, will not answer. Acon. removed these symptoms.

(ATTOMYR, *Arch.*, xi, 2, 109.) Delirium tremens. (BAYES, *Appl. Hom.* 45). Mania after delivery: the patients believe they cannot survive delivery, they lie quiet by day, are apathetic, give no reply to questions and only stare at the questioner, and then break out into laughter and weeping, refuse food and drink; their lips are dry, pulse full and frequent; the nurses have a difficulty in preventing their jumping out of bed at night. Starting out of sleep and repeating the same endeavour to run away. (HARTMANN, *l. c.*, p. 28.)

Apoplexy in a girl of 20, after a fright. (STURM, *Allg. h. Ztg.*, i, 66.) Apoplexy in a man of 64, given to all sorts of dissipation. (STURM, *ib.*, 67.) Apoplexia sanguinea. (KAFKA, *Prag. M. S.*, i, 148.) Apoplexy. (HANNEMANN, *Med. Cog. Veg.*, 99.) Prevention of sanguineous apoplexy. (SCHUBERT, *Arch.*, v, 3, 107.) Paralysis of particular parts after over-heating followed by a chill, with great painfulness of the affected parts to the touch, and great excitation of the vascular system. (HARTMANN, *l. c.*, p. 28.) Congestions to the head, especially in apoplectic constitutions, with vertigo and falling, roaring in the head, and transient unconsciousness. (SCHROEN, *Hyg.*, 102.) Congestions to the head. (HARTMANN, *l. c.*, 25.) State of irritation of the brain and lungs: acon. aided by bell. (DIEZ, *Hyg.*, xviii, 253.) Inflammation of the brain in children, aided by bell. (HEICHELHEIM, *l. c.*) A girl of 14: severe rigor, followed by heat and headache, nausea, vomiting; next day, on sitting up vertigo and vomiting, constant frontal pain, raving, much torpor, waking with cries, opens the eyes wide and stares at different parts of the room, during which she talks delirious nonsense; face at one time red, then pale, skin dry, hot, much thirst, no appetite, no stool for three days. Acon. 30, fourteen doses in three days, cured the patient. (WEBER, *Arch.*, xvi, 2, 4.) A boy, aged 5: in the evening sudden attack of severe rigor, followed by heat, headache at both sides, vomiting of food, drink and mucus, slumber with starting up from it. Next day red turgid face, sparkling eyes, single jerkings in the extremities alternating with trembling in them; on lifting the head, nausea; when he lays down the head again vomiting of mucus and water; the sparkling eyes are either staring at some point, or are closed in restless sleep, from which he often starts up delirious; skin dry, hot, much thirst, pulse rapid, full, and hard. Acon. 30 every hour cured in three days. (*Id.*, *l. c.*) A girl, aged 10: heat and redness of all the body, especially the head, red eyes, with contracted pupils, complete unconsciousness, raving, dry tongue, verdigris-coloured vomiting, obstinate constipation, jerking of the tendons, hurried respiration, pulse 120—130, small, grasping at the head. Acon. 18 removed the most of the symptoms, the rest yielded to bry. (GASTFREUND, *A. h. Z.*, xxiv, 114.) Hemicrania. (VOGEL, *Surg. Obs.*, 78; FLEMING, *op. cit.*, 139.) Pure nervous headaches. (RADLEY, *Lanc.*, 1837, 2.) Head affections of children during dentition: crossness, disinclination to play, laying down the head as if it were too heavy to be held up, unusual warmth of head, red conjunctiva, dilated pupils, circumscribed bright red spots on the hot cheeks, moderate appetite and tendency to vomit, inactive bowels. (SCHROEN, *Hyg.*, v, 102.) Inflammatory affection of head, throat and chest; throbbing

pain in the back of the head ; violent thirst, with dryness in the throat ; redness of the palate and throat ; slight swelling of the tonsils ; shooting pain on swallowing ; loss of voice ; on breathing deeply inclination to cough, and shooting in the side and betwixt the shoulders ; dry cough ; tearing in the wrist ; fingers stiff and swollen ; at night, burning heat of the whole body without subsequent perspiration ; sleeplessness for several nights ; aggravation of all the sufferings in the evening. Cured by acon. 3. (WATZKE, *Hom. Bekehrungsep.*, 105.) A kind of tetanus in a boy 6 years old. He woke up early, asked for something to drink, but could not take it because the jaws were spasmodically closed. This was followed by contortions of the eyes, he is alternately red and pale, and lies as if dead. Cured by two doses of acon. (HAUBOLD, *A. h. Z.*, i, 147.) Encephalitis in a woman aged 32. (KREUSSLER, *Allg. h. Z.*, xxix, 113.) Encephalitis in a girl of 9. (NOACK, *Allg. h. Z.*, xxi, 81.) Hydrocephalus acutus. (HAUBOLD, *Allg. h. Z.*, i, 146.) Sunstroke. (*Hirsch. Zeitsch.*, i, 142.) Myelitis : a man, aged 26, of gouty diathesis but well for two years, spent two nights dancing and drinking ; going home he fell to the ground and remained two hours exposed to the cold of winter. Brought home, he began to be convulsed and delirious. Next day he complained of weight and stupefaction of head, vertigo, roaring in the ears, general heat, burning and shooting pains in the spine, he must always lie on his back. Towards noon convulsions of the whole body, with cold extremities ; complete aphonia, and scarcely perceptible pulse. After this bright red face, red eyes, dry tongue, laborious breathing, interrupted by sighing ; the whole body stiff, the slightest touch of the spine causes violent convulsions, lasting a quarter or half an hour. When he tries to drink water it returns by the nose ; meteorism, stools and urine suppressed. Acon. 3, a drop every hour, continued for three days, caused marked benefit in all respects, the most dangerous symptoms went off. The remaining symptoms of vertigo, headache, roaring in the ears, weakness and fits of heat, were cured by nux vom. (HORNER, *Archiv.*, xx, 1, 121.) Hemiplegia. (GREDING, *Med. Schr.*, i, 229.)

Ophthalmia from a foreign body penetrating the eye (HARTMANN, *l. c.*, 15), and other mechanical injuries. (TRINKS in many cases.) Taraxis and chemosis. (HARTMANN, *l. c.*, 15.) Ophth. neonatorum in the first stage. (HARTMANN, *l. c.*, 15 ; GROSS, *Arch.*, x, 2, 63.) Rheumatic ophthalmia. (HUGHES, *Pharmacod.*, 163.) Rheumatico-traumatic ophth. (GOULLON, *l. c.*) Lippetudo, acon. and bell. (NANKEVILL, *B. J. of Hom.*, xx, 66.) Inflammation of both eyes ; the great swelling of the upper lid entirely covered the lower ; great photophobia ; burning shooting pains, much increased at night ; copious secretion of thin muco-purulent matter. Cured by acon. every two hours, and a dose of tr. sulph. in the evening. (WATZKE, *Œst. Ztsch.*, i, 2, 116.) Ophthalmia : redness and swelling of the lids, with pains and lacrymation, cornea dim and whitish, in a young man with gonorrhœa. Acon. 30 internally, and arn. 1 in water externally, cured ; cannabis cured the clap and dimness of the cornea. (LIEDBECK, *Hyg.*, iv, 411.) Burn of the eyes : lids swollen and red, cornea with-

out brilliancy and covered with a whitish skin, conjunctiva inflamed, photophobia and violent pains in eye, blisters on several parts of the face. Compresses moistened with weak solution of tr. acon. applied to the eye, cured in three days. (BRON, *Rev. med. Belge*, Aug., 1840.) Burn of the eye with a candle, cured by acon. 3. (DUDGEON, *Brit. J. of H.*, vi, 214.) Ophthalmo-blennorrhœa: swelling of both lids, especially the upper one, they are red, hot, and painful, much purulent mucus mixed with tears comes out from between them; conj. oculi much swollen, bright red, forming round the cornea an uniform, swollen, soft wall; cornea of left eye dull and grey towards the inside, an ulcer in the middle of the opacity without pus and with a grey base; great photophobia, constant flow of tears, constant tearing shooting pain in the eye and around it, much aggravated at night and in the evening, sensation in the eye as if it would come out, and as if the ball were swollen and too large; the left eye is the worst, vision in it dim and cloudy: in a man of 45. Cured by acon. 12 and 15, a drop every two hours, all except the ulcer, which yielded to tr. sulph. (KNORRE, *A. h. Z.*, xix, and *B. J. of H.*, vi, 214.) Sclerotitis. (DUDGEON, *B. J. of H.*, xi, 367.) Ophthalmia rheumatica. (JACHIM, *Allg. h. Z.*, lvii, 127.) Ophthalmia arthritica; acon. in doses of from 10 to 30 drops of strong tincture every hour or two hours, of no use in dilutions. (ROTH, *Hirsch. Z.*, iii, 30.) Acute glaucoma. (DE-KEERSMÆCKER, *L'Hom. mil.*, i, 271.)

Otitis. (KAFKA, *Prag. M. S.*, i, 92; *ib.*, ii, 152.) Acute otitis; acon. IX. (BAYES, *Appl. Hom.*, 45.) Otalgia. (FLEMING, *l. c.*)

Rheumatic face- and toothache of throbbing and shooting character, also in pains of other kinds, especially of sensitive persons with a tendency to turgescence of the blood, when wine and other heating things increase the pain; also when mental emotions or vexations have caused them; acon. 12 or 24, several drops in repeated doses. (J. W. ARNOLD, *Hyg.*, i, 65.) Prosopalgia from chill. (LABORDE, *Des Aconits*, 280-4; GÜBLER, *ib.*, 291.) Prosopalgia, tearing, raging in left cheek after a chill. (KAFKA, *Prag. M. S.*, ii, 152.) Prosopalgia in a pregnant woman, very violent, tossing about and screaming. (*Allg. h. Z.*, xliii, 161.) Prosopalgia. (RADEMACHER, HUFELAND, THESIUS, GABALDA, TURNBULL, SKEY—v. *Reil's Aconit.*) Tic douloureux. (FLEMING, *op. cit.*, 139.) Prosopalgia of inflammatory nature with inflammatory swelling, and also of a purely nervous nature, with creeping burning pains, coming on in jerks, as if dependent on an ulcer. (HARTMANN, *l. c.*) Throbbing toothache, with great rush of blood to the head; burning heat of the face; quick, hard pulse; great mental and bodily restlessness; great redness of the cheeks, especially after taking cold in sharp, dry, east wind. (BÖNNINGHAUSEN, *Arch.*, xv, 2, 5.) Toothache, throbbing and shooting, with congestion towards the head. (HARTMANN, *l. c.*) Frequently recurring toothache: burrowing in the teeth, proceeding from the shoulder of the affected side and extending into the temple and head, most violent at night; at the same time congestions to the head, heat and redness of the cheeks. Cured with three doses of acon. 30. (ALTHER, *Hyg.*, i, 335.) Violent toothache after getting wet, tearing, throbbing. (KAFKA, *l. c.*, ii, 70.)

Epistaxis of young plethoric persons, subject to congestions. (WEBER, *Arch.*, xvi, 2, 13; ROSENBERG, *Krank. d. Resp. u. Circ. O.*, 23.) Epistaxis, frequently recurring, extremely exhausting at the period of decrepitude in women, caused by congestions towards the head. Acon. 3. (SCHROEN, *Hyg.*, v, 101.)

Inflammation of the tongue, with violent inflammatory fever and affection of the throat in cattle. Inflammation of throat and fauces. (HAHNEMANN, *M. M. P.*, i, 26.; SCHMOGER, *Hyg.*, ii, 275, cured by tr. acon., gtt. 60, in two chopins of water, $\frac{1}{8}$ every three hours.) Rheumatic sore throat with slight redness of the fauces and prominent muscular pains. (GOULLON, *l. c.*) Cynanche tonsillaris. (HOFRICHTER, *A. h. Z.*, xlviii, 122; KAFKA, *l. c.*, i, 93; HIRSCH, *H. V. S.*, iii, 140; TESSIER, *Mem. sur les effets ther. de l'Acon.*) In one case it averted the impending suppuration in cynanche, which bell. and merc. were unable to do, in doses quickly repeated. (SCHROEN, *Hyg.*, v, 101.) Œsophagitis: violent pains in the cardiac region extending from the middle of the chest to the back, increased by corporeal exertion and by swallowing, with the sensation as if the morsel swallowed stuck in the œsophagus or cardiac region; at the same time fever and complete absence of all abnormal symptoms about the heart. A few doses of acon. 12 cured it in two days. (SEGIN, *Hyg.*, xviii, 53.)

Gastralgia. (HOFRICHTER, *A. h. Z.*, xlv, 163, 254; FLEMING, l. c.) Gastritis. (WOLFSOHN, *Hyg.*, v, 457). Nausea and vomiting of all food and drink in the first half of pregnancy cured by 1 drop of tr. acon. (GASPARI, *Annal. d. h. Kl.*, i, 150.) Vomiting in cholera asiatica after the removal of all the other symptoms. (RUMMEL, *Arch.*, xii, 2, 123.) Hæmatemesis in a newborn infant, with bloody stools. (SCHRETER, *N. Arch.*, iii, 2, 135.) Hepatitis. (HARTMANN, *l. c.*; WEBER, *Arch.*, xvi, 1, 84.) Jaundice in a boy of 12. (SOMMER, *Allg. h. Z.*, xxx, 331.) Jaundice. (KAFKA, *l. c.*, i, 107; *A. h. Z.*, lvii, 103.) Enteritis. (WOLFSOHN, *Hyg.*, v. 456.) Inflammation of the bowels: acute burning, tearing pain, with very great tension, heat, distension and excessive sensitiveness of the whole abdomen to the slightest touch; violent synochal fever, obstinate constipation, anxious restlessness, despairing anxiety, as if in the death agony; constant thirst, sleeplessness. (HARTMANN, *Ann.*, i, 207.) Gastro-enteritic symptoms dependent on vermicular irritation. (GERSTEL, *Œst. Ztsch.*, i.) Inflammatory affection of the peritoneum and bowels in a puerperal woman, after suppression of the lochia from fright, cured by acon. 30. (SEITHER, *Hyg.*, ii, 194, and SCHROEN, *Hyg.*, v, 100; in the latter case there were also present anxiety with great fear of death, sleeplessness, and deliria.) Violent abdominal pains of a drawing character, with clawing, pinching, and retraction of the navel; at the same time frequent white evacuations; shooting and pressure in the anus; general heat; painful prostration of the whole body; yellow skin and sclerotic; violent thirst and dry mouth. Cured by six doses of acon. 6. (TIETZE, *A. h. Z.*, xxii, 202.) Tearing and shooting pains in the abdomen, increased by pressure and deep inspiration, with alternate rigor, heat, and sleeplessness; cured by four doses of acon. 6. (WOLFSOHN, *Hyg.*, v, 460.) Peritonitis. (TRINKS, *Hirsch Z.*, i, 54;

STERN, *ib.*, ii, 214; KIRSCH, *A. h. Z.*; KAFKA, *Pg. M. S.*, i, 23, 38; GARAY, *Œst. Z.*, i, 2, 236.) Peritonitis in a man, aged 36. (FRANK, *Allg. h. Z.*, xix, 34.) Peritonitis in a woman, aged 30: meteorism, vomiting of verdigris coloured fluid. (HUBER, *Œst. Ztsch.*, iv, 441.) Inflammation of bowels in a man of 22 after a chill. (SCHWARZE, *Hom. Heil.*, 92.) Inflamed strangulated hernia in two cases. (GOULLON, *Arch.*, xiv, 2, 138.) Peritonitis puerperalis, along with bry. and puls. (RAU, *Werth d. H.*, 202.) Peritonitis puerperalis after a chill, with watery diarrhœa, which latter yielded to cham.; the inflammation was cured by acon. 4 every three hours. (DIEZ, l. c., 102.) Diarrhœa, with great pain, after a chill. (KAFKA, l. c., i, 108.) Sporadic cholera. (KAMMERER, *Hyg.*, iv, 490.) Cholera asiatica with gastro-enteritic symptoms. (BAERTL, *A. h. Z.*, viii, 165.) Cholera asiatica. (HEMPEL, App. to *N. Amer. Hom. Jour.*, No. 2; CRAMOISY, *L'alcool d'Acon. dans le trait. du Chol.*) In cholera infantum is indispensable. (MADDEN, *Ann. of B. H. S.*, v, 57.) Dysentery. (MARBOT, *B. J. of H.*, viii, 458.) Non-febrile worm ailments. (MALY, *Hyg.*, xviii, 505.) Inflammatory strangulated hernia: violent burning pain as if red hot coals lay in the hernial sac, that did not allow of the slightest touch; constant nausea, bitter, bilious, grass-green vomiting; great anxiety, general cold sweat, small, spasmodic contracted pulse. Acon. in repeated doses removed the painfulness of the rupture, the vomiting, the anxiety, and the cold sweat; the replacement was effected by means of sulph. (WAHLE, *Arch.*, xv, 2, 162.) Inflammation of the hæmorrhoidal protuberances with synochal fever. (HARTMANN, l. c.)

Orchitis after gonorrhœa cured by acon. 3 every hour. (GULYAS, *Arch.*, xix, 2, 156.) Gonorrhœa. (POPE, *B. J. of H.*, xxv, 508.) Syphilis. (STOERCK, *op. cit.*, FRITZE, *Med. Ann.*, i, 327.) Cystitis. (HERING, *Hom. Hausarzt*, 260.) Retention of the urine from inflammation of the neck of the bladder; acon. 4. (FRANKE, *Hyg.*, xiv, 377.) Acute prostatitis. (BAYES, *Appl. Hom.*, 45.) Cystitis. (SCHWARZE, *Hom. Heil.*, 95.) Fright or vexation after menses. (HAHNEMANN, *M. M. P.*, i, 26.) Sudden suppression of the menstrual discharge from mental emotions. (HARTMANN, l. c.) Metritis after difficult delivery with instruments. (WUERZLER, *A. h. Z.*, xxi, 8.) Amenorrhœa. (MALAISE, *Allg. h. Z.*, xiii, 303; WEST, *Arch. Gen.*, Aug., 1835.) Dysmenorrhœa and menorrhagia. (ELB, *B. J. of H.*, xi, 148.) Colic following suppressed menses. (NANKIVILL, *B. J. of H.*, xxi, 424.) Menstrual colic. (ELB, *B. J. of Hom.*, xi, 148.) Puerperal fever. (BOSCH, *Hyg.*, xix, 103; DIEZ, *Ansichten*, 102.) Milk fever. (TIETZE, *Allg. h. Z.*, iv, 263.) Metritis after a chill. (SEITHER, *Hyg.*, vi, 137.)

It cuts short acute affections, such as colds, whether caused by cold or not, when given in their incipient stage: a dose every half hour. (MADDEN, *Brit. Jour. of Hom.*, ix, 497.) Epidemic catarrhs of children that tend to go into bronchitis catarrhosa. (HARTMANN, *A. h. Z.*, vi, 69, and GRIESSELICH, *Hyg.*, iv, 312.) Bronchitis catarrhalis. (KAFKA, l. c., i, 107; LÖW, *Œst. Z.*, i, 41, 35.) Grippe. (BALOGH, *A. h. Z.*, ii, 108; KRETSCHMAR, *ib.*, 115; CROSERIO, *ib.*, xxxvi, 11; KRAMER, *Hyg.*, i, 17; SOLLIER, *ib.*, xxiii, 133; BERNSTEIN, *Mosaik*,

263.) Laryngitis catarrhalis. (RUMMEL, *A. h. Z.*, ii, 187; HUBER, *Œst. Z.*, iv, 434.) Acon. is not only often able to check the development of commencing croup, but it also supports the action of spong. and hep. in the stage of plastic exudation when given alternately with those remedies. (SCHROEN, *Hyg.*, v, 99.) Croup. (HAHNEMANN, *M. M. P.*, i, 26; SCHLUKER, *A. h. Z.*, x, 372; MÜLLER, *Hyg.*, viii, 435; KÄSEMANN, *ib.*, xi, 204; GOULLON, *N. Arch.*, ii, 1, 33; NG., *Ann.*, ii, 223; ELB, *Hom. Viert.*, ii, 357.) Rheumatico-catarrhal and nervous form of croup: at the commencement of the north-east wind, or on the change of the east wind into south or west, it begins with slight short cough, which, generally towards midnight, turns into hoarse crowing cries; rare crowing, hollow cough; very rough, hoarse, or whispering voice, resembling the vox cholerica; whistling, hooping, loud respiration, suffocative spasm: acon. removes the urgent danger and keeps off the disease till daybreak. Towards morning perceptible remission with perspiration, also with bleeding at the nose, rarely with vomiting of viscid phlegm. The following night the same scene is repeated, which renders necessary the repetition of the acon. The next aggravation, on the third day, the wind still continuing in the east, is always slighter and more easily relieved. Then the disease is permanently relieved and changes into frequent loose cough. In this laryngitis, caused by the peculiar atmospheric tension, acon., from the 24th to the 2nd dil., in rapidly repeated doses is sufficient; whilst the fully developed true croup, which never attacks any other but scrofulous children, who are subject to strumous thyroid gland, ozœna-like coryza, or tubercles of the lungs, requires quite different remedies. (GOULLON, *Arch.*, xix, 2, 1.) These observations exactly coincide with Dr. Trinks' experience. True croup requires spong. or iod., whilst the above-mentioned laryngitis is cured by acon. alone, by the allopaths by calomel. (TRINKS, *Mat. Med.*) Shaking nocturnal spasmodic cough (in great tobacco smokers) caused by a tickling irritation in the larynx. (HARTMANN, l. c.) Whooping-cough in the first stage. (HARTMANN, l. c.) Commencing whooping-cough corresponding to the congestive stage in the mucous membrane of the bronchial tubes in a peculiar condition of atmospheric pressure. (BETHMANN, *Annal. d. h. M.*, iv, 289; HAUBOLD, *A. h. Z.*, i, 146; MALY, *Hyg.*, xviii, 512.) Hæmoptysis caused by tubercles. (HEICHELHEIM, *Hyg.*, v, 206.) Hæmorrhagia pulmonum. (HARTMANN, l. c.) Pure inflammatory affections of the respiratory organs. (SCHROEN, *Hyg.*, v, 99.) Pneumonia: during the rigor, oppression, stitches in the chest; fever with the character of synocha, or erethism with remittent type; face red, hot, puffed; eyes sparkling; swelling of the veins of the neck, short respiration, marked, crepitating respiratory sound; oppressive, compressive, dull, shooting pain in the chest, only permitting recumbency on the side, accompanied by attacks of anxiety; short, dry, irritating cough, or coughing of blood; raw pain in the region of the last ribs, caused by the succussions of the diaphragm. (BUCHNER, *Hyg.*, xv, 503.) Pneumonia with great dyspnœa, brownish-red face, bloody expectoration, and violent shooting in the left side. (SCHLEICHER, *Arch.*, xv, 2, 128.) Inflammation of the lungs with shooting pains deep in the chest, and pulse

100. (SCHUELER, *Arch.*, xiv, 3, 120.) Pneumonia. (HUBER, *Œst. Z.*, iv, 435; RAU, *Werth d. h. Heilv.*, 161; KIRSCH, *Hyg.*, vi, 144; SCHOLZ, *Arch.*, xx, 3, 115; VEHSEMEYER, *A. h. Z.*, xi, 280; FRANK, *ib.*, xvii, 100; SCHWARZE, l. c., 60; BOSCH, *A. h. Z.*, iv, 58; SONNENBERG, *Arch.*, v, 2, 78; BERNHARDI, *ib.*, iii, 1, 81; GULYAS, *ib.*, xix, 2, 149; SCUDERI, *Hyg.*, vi, 543; MARTINI, *Ann.*, i, 26; EMMRICH, *Arch.*, xiv, 3, 109; KOPP, *Denkw.*, 304; ELWERT, *Die Hom.*, 158; *A. h. Z.*, xxviii, 280, *ib.*, xxxi, 141; SCHÜLER, *Arch.*, xiv, 8, 120; TRINKS, *Ann.*, i, 21; SCHWARZE, *ib.*, 25; KAFKA, l. c., i, 24; CASPAR, *Œst. Z.*, i, 1, 262; BATTMANN, *Hirsch. Z.*, 3, 169; *Klin. Stud.*, 61.) Pneumonia and pleuritis in all stages [?]. (HEICHELHEIM, *Hyg.*, v, 204.) Asthma. (GREDING, *op. cit.*, i, 248.) Inflammation of the lungs with gastric nervous symptoms. (SCHOLZE, *Arch.*, xx, 3, 115.) Peripneumonia. (VEHSEMEYER, *Arch.*, xi, 298.) Pleuropneumonia: acon. always removed the fever and inflammation, so that bry. had only to be used for the afebrile shooting pains. (DIEZ, l. c., 96, in many cases.) Pleuritis costalis with shooting pains, increased by touching the thorax and breathing, with dry cough, fever, &c.; acon. 9 in repeated doses cured. (DIEZ, l. c., 94.) Pleuritis. (FRANK, *A. h. Z.*, xxi, 277; SEIDEL, *Arch.*, xi, 1, 128; *Ann.*, i, 27; HOFFENDAHL, *Ann.*, iv, 281; BAUDIAS, *ib.*, iv, 435; WOLFSOHN, *Hyg.*, v, 452; KÄSEMANN, *Hyg.*, ix, 323; *Hom. Bekehrungsep.*, 109; ROTHANSL, *Hyg.*, xviii, 485; GRIESSELICH, *ib.*, iii, 86; KOPP, *Denkw.*, 306-7; EMMRICH, *Arch.*, xvii, 1, 136; NG., *A. h. Z.*, xv, 129; BEILBY, *B. J. of H.*, x, 308; GARAY, *Œst. Z.*, i, 2, 236; LÖW, *Pr. M. S.*, viii, 169; TRINKS, *Annal. d. h. Kl.*, ii, 227, and 1, 21; ROTHANSL, *Hyg.*, xviii, 485; MARTINI, *Annal. d. h. Kl.*, i, 26.) Pleuritis: after severe rigor, burning heat and shooting in the right side, cough with expectoration streaked with blood, difficult respiration, pulse full, hard, intermitting, not quickened. Acon. 6 made the chest and breathing freer in five hours, cure on the fourth day. (RAU, *Werth d. H.*, 200.) Pleuritis of the left side with distinct pericarditis. (GOULLON, *Arch.*, xix, 1, 44.) Pleuritis with violent febrile symptoms: it has no action on the effusion. WURMB, *Hyg.*, xii, 29, and *B. J. of Hom.*, i, 50.) Pleuritis and Pneumonia. (QUADRI, *Arch.*, vii; 2, 165.) Frequently recurring inflammatory states in consumptive patients, which give evidence of their existence by shooting pains in the affected parts, severe cough with bloody expectoration, violent fever with great distinctness of the redness of the cheeks. (HARTMANN, l. c.) Inflammatory irritations in florid phthisis, in the tuberculous as well as pituitous form. (HEICHELHEIM, *Hyg.*, v, 207.) First stages of phthisis. (BASCH, *Nat. et Trait. de la Phthisie.*)

Inflammation of the heart in the first stage. (HARTMANN, l. c.) Inflammation of heart. (HUBER, *Œst. Ztsch.*, iv, 479.) Cardiac inflammation in acute rheumatism. (HUGHES, *Pharmacod.*, 164.) Pericarditis rheumatica: tearing shooting pains in the feet and hands, violent shoots in the cardiac region, furred tongue, increased thirst, quickened respiration, pulse full and normal, percussion-sound normal, heart's beats stronger, blowing sound in the left ventricle during the systole: in a girl, 24 years old, after a chill. Acon. 3 every three hours, and

cold compresses to the joints. (ROTHANSL, *Hyg.*, xviii, 480.) A similar case was cured by acon. and spig. alternately. (SCHROEN, *Hyg.*, xv, 490.) Neuralgia cordis. (GOURBEYRE, *Rév. Therap.*, 1856, 67.) Palpitation. (FLEMING, *op. cit.*, 143.) Palpitation of the heart from mental emotions. (HARTMANN, l. c.) Frightfully painful palpitation of the heart, with peculiar pains in the joints. (STAPF, *Arch.*, ii, 3, 32.) Asthma humidum, aided by stan. (HARTMANN, l. c.) Inflammation of the diaphragm. (HARTMANN, l. c.)

Violent tearing and shooting in the right upper arm and the same side of the chest, with redness and swelling of the upper arm, painful on every motion, boring shoots in the chest on breathing; pulse quick. (FLEISCHMANN, *Hyg.*, viii, p. 467, acon. 6 every three hours, with compresses of cold water.) Stiff neck, lumbago, sciatica. (FLEMING, *op. cit.*, 138; TODE, *Med.-Chir. Bibl.*, ii, 1, 170; HUGHES, *Pharmacod.*, 163.) Violent shooting pains in the hip-joint, extending into the left knee. (EMMRICH, *Arch.*, xiv, 3, 109.) Pain in hip-joint. (HUBER, *Œst. Z.*, iv, 445.) Chronic arthritis. (GERSTEL, *Œst. Z.*, i, 2, 287.) Cutting shooting pains in the right knee-joint, worst at the external side. Acon. 30 every four hours cured it completely. (WEBER, *Arch.*, xvi, 2, 11.) Rheumatic inflammation of the knee-joint, with tearing pain. (KNORRE, *A. h. Z.*, v, 21.) Rheumatic inflammation of the hoof in horses. (REHE, *A. h. Z.*, vi, 205.) Rheumatic pains. (CHAPP, *Rec. per. de la Soc. de Méd.*, xxiv, 2, 136.) Paralysis arthritica. (KAUSCH, *Med. and Chi. Erf.*, 61.)

ANTIDOTES.—In cases of poisoning by large doses of aconite, the drug should be removed from the stomach, if possible, by large draughts of warm water and irritation of the fauces, or any of the more ordinary emetics, or the stomach-pump. When the arterial system is in a state of great excitement, vegetable acids, such as vinegar or lemon-juice, mixed with water, should be given. For the paralytic symptoms, the remedies are: cocculus, agaricus, rhus, nux vomica, arnica, wine, coffee. When there is a state of sopor, exhausting sweats, and dilated pupils, opium is the proper remedy. Arnica is indicated when there are obstinacy, hot face, and headache. The extremely peevish and irritable state often induced by it demands wine. For the other symptoms caused by aconite, antidotes may be sought among the following: belladonna, bryonia, chamomilla, china, digitalis, gelsemium, hyoscyamus, ignatia, nux vomica, sepia, spigelia, veratrum album, and viride.

ALLIED REMEDIES.—Arnica, belladonna, bryonia, digitalis, gelsemium, hyoscyamus, ignatia, ipecacuanha, mercurius, nitrum, nux vomica, opium, phosphorus, pulsatilla, rhus, sepia, spigelia, stramonium, sulphur, veratrum.

DOSE.—The British Pharmacopœia recommends from 5 to 15 drops of the tincture as the proper dose, but this is evidently too large. Ringer advises half a drop or a drop, or even less. Hahnemann in his later days recommended the 30th dilution, but most homœopathic practitioners agree that it is unnecessary to give this remedy in such minute doses, especially in acute diseases, indeed, that it acts much more promptly and certainly in such cases in the lower dilutions, from the 1st to the 6th dilution, and that it may be advantageously administered

at much shorter intervals than those Hahnemann prescribes, from every twelve hours to every quarter of an hour, according to the acuteness of the case. For the neuralgic affections in which aconite is indicated, the higher dilutions, from the 12th to the 30th, given at longer intervals, seem to have been often employed with remarkable success, yet Gübler and Laborde found nothing but benefit from ¼ to ½ milligramme of aconitine, which would represent much larger doses of aconite than even those of the B. P.

ACONITUM NAPELLUS.

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CROTALUS

(RATTLESNAKE).

BY

JOHN W. HAYWARD, M.D.

"Here not only is it true that *quantum venenum, tantum remedium*, but also *quale venenum, tale remedium*."—Dr. RICHARD HUGHES, *Lect. on Serpent Venoms.*

PREFACE.

THE history of the *Serpent* is closely connected with that of our own race, and the earliest historical records make it evident that a knowledge of the deleterious properties of the *Venom* of some serpents was possessed by the earliest of our ancestors.

The *Serpent Venoms* hitherto introduced into Medicine are *Lachesis*, *Crotalus*, *Naja*, *Elaps*, and *Vipera*. Their Pathogenesy and Therapeutics, as far as then known, were collected by CONSTANTINE HERING, and published in 1837 in one essay (*v.* Bibliography, IIm, and III a, pp. 160, 161). Dr. Hering acknowledges that the effects of the various Serpent Venoms differ, not only as between genus and genus, but as between the several species of each genus; but he justifies his act of putting them into one essay by the state of the knowledge of the subject at that time, and by their great family likeness.

At the time Dr. Hering wrote it might be allowable to mix together the effects of the various Serpent Venoms, because of the scanty knowledge respecting *Crotalus* and *Naja;* but it would not be so now, since the effects of *Crotalus* and *Naja* have been so well studied. There certainly is an intimate "family" likeness amongst their effects, but there are also as certainly "generic" differences. Broadly stated these differences are: that the hæmatic element predominates in the effects of *Crotalus*, and the nervous element in those of *Naja;* whilst in the effects of *Lachesis* these elements are more equally represented. For an excellent comparison of them *v. North American Journal of Homœopathy*, xvi, 505, 506, Bibl., III, p. 163.

It has, therefore, been deemed necessary to separate the symptoms of the various Serpent Venoms, and to make those of each the subject of a distinct article in this *Materia Medica;* because, also, there can be no true substitutes amongst *specific* medicines. Nevertheless, from the intimate family likeness in their effects, and *Lachesis* being a better proved and more extensively used drug, the knowledge of the pathogenesy of *Lachesis* may be utilised, mentally, to fill in the finer shades in the pictures broadly outlined by the poisonings and experiments with *Crotalus* and *Naja;* whilst the absolute effects and structural lesions furnished by the pathogenesies of *Crotalus* and *Naja* may well serve to complete the morbid pictures finely sketched by the literature of *Lachesis*. Also, much of the clinical experience with *Lachesis* may be accepted in confirmation of the therapeutical powers of *Crotalus* and *Naja*.

Accounts of bites by venemous serpents are to be found in the literature of all ages, especially in that of tropical and sub-tropical countries.

True rattlesnakes being exclusively an American genus, it is in the literature of America and American travellers and physicians that the best accounts of poisonings by *Crotalus* are to be met with, though they are to be found in the writings of physicians, ophiologists, and physiologists of all countries.

By a personal visit to the Libraries and Natural History Museums of Washington, Philadelphia, New York, and Boston, in America; and of the British Museum and Royal College of Surgeons, in England; and by the kind assistance of medical and other friends in America, France, and Germany, of Mr. Moore, the curator of the Liverpool Museum, and of Mr. Cowell, the Librarian of the Liverpool Free Library; and by the aid of the very complete "*Bibliography*" given by Dr. MITCHELL as "Appendix B" to his Monograph; of the "*Enumeration of Genera and Species of Rattlesnakes with Synonyms and References*," by E. D. COPE, given as "Appendix A;" and of the references furnished by T. F. ALLEN in the "*Encyclopædia of Pure Materia Medica*,"—the identity and habitat of the genus and species have been verified, and the original records of Bites and Experiments have been directly consulted, for the historical and pathogenetic information presented in the present Essay, *v.* Bibl. I and II. For the therapeutical applications and confirmations, besides the articles enumerated in the Bibl. III, the various homœopathic journals and essays have been consulted; and many colleagues in America and elsewhere have been corresponded with. The monograph of Dr. CONSTANTINE HERING has been the subject of careful examination: his symptoms from bites have been traced to their original records; but his Provers' symptoms have been taken as he has given them, and the Prover's name, as well as the number of the symptom, attached to each. Dr. ALLEN'S references, also, have been carefully examined, and the symptoms traced to their original sources; and the experiments with *Crotalus Venom* performed by Dr. BRUNTON and Sir JOSEPH FAYRER have been added, as well as some original Experiments and Provings by the writer and his friends.

It is therefore believed that the present Essay will be found to contain all the valuable information on the subject on which it treats that is available up to the present time.

LIVERPOOL, 1884.

INTRODUCTION.

1. Is the Venom of a snake capable of being used for medicinal purposes at all, is a question which may not unnaturally be asked by many physicians; and, judging by their experience in studying and using such substances as are commonly employed as drugs, they will be disposed to answer it in the negative. But if the method of studying the physiological effects of poisons, and the principle of selecting medicines, first taught to any practical purpose by SAMUEL HAHNEMANN, are adopted, it will be found that *Crotalus Venom* is capable of being not only a remedy in certain forms of disease, but a very valuable one.

2. Unlike such drugs as *Opium*, *Ipecacuanha*, *Aloe*, and *Mercury*, which can be employed either anti- or homœo-pathically, *Crotalus* is a medicine which can only—so far as our present knowledge goes—be used under the guidance of its specific action. It has no sphere of usefulness as an antipathic medicine, but when the symptoms which indicate a given form of disease are like those that *Crotalus* will produce, its power as a remedy is incalculable, as the facts adduced in the present Essay will show.

3. Unlike such drugs as *Colchicum* and *Belladonna*, which are very poisonous to man, but almost innocuous to some quadrupeds, *Crotalus* is alike poisonous to man and the lower animals, and it produces the same effects in both.

4. Like other drugs, *Crotalus* produces the same generic effects however introduced into the system, whether through the mouth or through some other mucous or serous membrane, or by subcutaneous injection; and, as with other drugs, the effects are more certain, more rapid, and more severe when it is made to enter the blood direct.

5. The effects enumerated in the present Essay have been collected from the results of the introduction of the *Venom* of different species of *Crotalus*, especially the *durissus* and *horridus*. The medicine should therefore be called CROTALUS simply, not CROTALUS HORRIDUS. The difference in the character of the symptoms produced by the *Venom* of the different *species* is so little that it has not been thought necessary to distinguish in this Essay the symptoms attributed to each; nor indeed would this have been possible with the materials at our command. Neither is it to be expected that the *Venom* used as a medicine either has always been, or will always be, that of any one species exclusively; hence the distinction would have been unwise.

6. The whole of the matter is arranged in four parts: Part I,

Descriptive; Part II, Collection of Pathogenetic Material; Part III, Arrangement of the Pathogenetic Material, or Symptom Register; Part IV, Uses of the Drug.

7. The Natural History, Anatomy, Physiology, Chemistry, Pharmacy, and Toxicology, as well as the Mechanism of the Bite, Antidotes, &c., of *Crotalus* are given as briefly as their novelty and importance would allow; but the PATHOGENESY is given as full and complete as possible with the material at our disposal. The Narratives of Provings, Experiments, and Bites are given in full detail, because these are the real and only sources of a knowledge of the power and sphere of the drug, and they should be studied in the language of the original narrators. (*v.* "Revision and Re-construction of the Mat. Med.," by FRANCIS BLACK, M.D., *Brit. Journ. of Hom.*, xxxix, 332, also Dr. DRYSDALE, on the same subject, under the title of "The Chief Task of Homœopathy," *ibid.* xli, *v.* especially p. 4, *et seq.*) The *Provings* are given in a list under the letter "**A**;" the *Experiments* under "**B**;" *Bites* in the Human Subject under "**C**;" and *Bites* in the Lower Animals under "**Ca.**"

8. In order to furnish in this Essay what is known of the poisonous effects of *Crotalus* on the animal body, all the pathogenetic effects that could be obtained have been thrown together as a "Collection of Pathogenetic Material." And in order to display the local action of the drug, the effects it produces on the different organs or regions of the body have been picked out and arranged under the different anatomical "Sections" as a "Symptom Register." In both the effects resulting from the introduction of the *Venom* by the mouth and those of voluntary Provings have been placed first in each section; those resulting from Experiments second; those from Bites in the Human Subject third; and those from Bites in Animals fourth. It must not be supposed that this arrangement indicates any great superiority of one set of symptoms over the others; all are essential in an attempt to display the full pathogenesy of the drug, and all are similarly useful (*v.* HERING, Preface *Die Gründe*, 1, 2, 3, 4, &c.). By *Bites* structural lesions and serious functional disturbances are produced; by *Experiments* mainly absolute effects and objective symptoms are brought about; *Provings* elicit more of the subjective, contingent, and mental symptoms.

9. In the SYMPTOM REGISTER, which follows the Pathogenesies, the endeavour has been to give separately, and as much as possible only, the Idiopathic Effects which the drug produces on the different organs or regions of the body (*v.* Original Introduction to Part I, p. iv, line 19-31 first col., line 19-28 second col., and p. v, line 21-30 second col.), and to give these so as to indicate the local effects clearly and distinctly; at the same time trying as much as possible not to sever them from their natural connections in the complete narrative; and yet avoiding the giving of groups so large as to be inconvenient to the busy practitioner in search of some particular symptom, referring him for the complete disease-picture to the narrative itself, the lines of which are numbered for the purpose. The Narratives are given as nearly as possible in the words of the narrators themselves, but in the cases of DRAKE, STEEL, SOPER, and WOODHOUSE, the account is so long, diffuse,

and disjointed that epitomes of them have been made, so as to form a more connected narrative, and the symptoms have been registered from these epitomes.

Post-mortem results are added whenever available.

10. Under the "General Action" a few of the *similarly-acting drugs* are named (*v.* p. 182, also 180 and 181), but for drugs having similar "Topical Action," and for analogous Individual Symptoms, reference should be made to the *British Repertory*, or to the *Symptom Register* of Dr. T. F. ALLEN, because a selection from them would be misleading. And under the "Therapeutics" reference should be made to Dr. RICHARD HUGHES'S *Manual of Therapeutics*, or to the *Clinical Index* at the end of his *Pharmacodynamics*, 4th ed.

11. A REGISTER of the *symptoms* is prepared under each Organ or "Section" of the body; after each register is added an INDEX, to enable any particular symptom to be found without trouble or loss of time; then follows a COMMENTARY on the pathogenetic Indications of the drug; and after this follow some hints as to the THERAPEUTIC SPHERE of the medicine; and finally, some CLINICAL CONFIRMATIONS of the therapeutical indications.

12. As the table of CONTENTS will show, there has been an attempt to present to the Medical Profession an account of this valuable drug sufficiently exhaustive—pharmaceutically, chemically, toxically, and therapeutically—to render it unnecessary for its members to consult any other work on these points; whilst at the same time copious references are given to enable them to do so if they should wish.

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BIBLIOGRAPHY.

I. NATURAL HISTORY OF CROTALUS.—Accounts of the habitat, form, structure, habits, and natural and historical peculiarities of the rattlesnake are to be found in almost all works on the natural history of reptiles; especially in those treating of American reptiles.

The following will afford all the information necessary for our present purpose:

a. Catalogue of the North American Reptiles in the Museum of the Smithsonian Institution. Part I. **Serpents**, by S. F. BAIRD and C. GIRARD. Smithsonian Institution. Washington, January, 1853.

This work treats principally of the North-American species of the family Crotalidæ, but in this respect it may be implicitly relied upon as affording the most recent, the most accurate, and the best nomenclature extant.

The nomenclature given by these authors is that adopted in the present essay.

b. Iconographic Encyclopædia. J. G. FLECK. Translated by S. F. BAIRD. In four volumes, Vol. II, Art. **Ophidiæ**: R. Garrigue. New York, 1851.

This work gives very good, full, and correct information on the genus *Crotalus*, as well as on the family Crotalidæ, and the whole order of serpents; and may be consulted with great satisfaction, as affording all necessary information on both North and South-American serpents.

c. Ophidians: the Zoological Arrangement of the Different Genera. By S. B. HIGGINS, S.A. Boericke and Tafel, New York. 1873.

This is a laborious attempt at classification of the different genera and species of the family Crotalidæ, but it bears evidence of want of accuracy of information on the natural history. Its main object is to support the delusion that a serpent's gall is the antidote to its venom. For a review of it, *vide British Journal of Homœopathy*, xxxii, 158.

d. Illustrated Natural History. By the Rev. G. WOOD. Routledge and Sons, London. 1874.

This is the work appealed to by the editors of the first and second editions of the *British Homœopathic Pharmacopœia*. Though of a rather popular character, it is a work of considerable merit, and affords much useful information on the subject of serpents. But the author adopts the name *Uropsophus* instead of *Crotalus* to designate the genus—an alteration neither necessary nor desirable.

e. SNAKES.—*Curiosities and Wonders of Serpent Life.* By CATHERINE C. HOPLEY. Griffith and Farran, London, 1882.

This, which is the most recent work on snakes, is a nice handy octavo volume, of some 600 pages. It is prettily illustrated and interestingly written, and well deserves its title. It gives some very instructive chapters on rattlesnakes, rattles, fangs, &c., which will well repay careful perusal.

f. "Appendix A" to Dr. Mitchell's Monograph :—"*An enumeration of the genera and species of rattlesnakes, with synonyms and references, by* E. D. COPE."

This is a very full and complete summary of the nomenclature and sources of information of the genera and species. But it would have been better had the author not complicated matters by dividing rattlesnakes into Crotalus and Caudisona. The distinction is not necessary or desirable.

Those who wish for further information on this subject will find it in the different encyclopædias ; in the articles **Rattlesnake, Serpents, Reptiles,** &c.

II. CROTALUS AS A POISON—PATHOGENETIC.

a. The earliest and best descriptions of the poisonous effects of Crotalus Venom are afforded by the *Accounts of Bites* inflicted on the human subject by rattlesnakes. These are to be found in various medical and other journals, transactions and essays, especially of America—the country of the rattlesnake. Some of these afford fair pictures of the effects produced, but most of them are little more than records of fatal results. All that could be found have been collected, and given in a list under the letter **C**, p. 211.

b. Accounts of Bites in Animals have been collected and given in a list under the letters **Ca**, p. 237.

The next in the order of appearance are the essays of Dr. S. WEIR MITCHELL. But, in relation to the purpose of the present essay, the next in importance are the records of "PHYSIOLOGICAL EXPERIMENTS" and of "PROVINGS" made by various experimenters and others with the definite intention of discovering the effects and symptoms produced by Crotalus Venom.

c. Physiological Experiments.—The accounts of these furnish the moderately severe and the slight structural lesions, and the severe functional symptoms—the objective symptoms. They are given in a list under the letter **B**, at p. 206.

d. Provings.—The accounts of these furnish slight structural, but mainly the functional, contingent, and mental symptoms—the subjective symptoms. They are given in a list under the letter **A**, at p. 195.

In the present essay reference to the source is given at the end of each narrative.

e. The second in order of appearance, and the third in importance of the sources of information on this subject, is the monograph by Dr. Mitchell. *Researches upon the Venom of the Rattlesnake.* By S. WEIR MITCHELL, M.D. ; *Smithsonian Institution's Contributions to Knowledge*, Vol. xii, Art. vi, Washington, 1861.

In this essay are given, not only a summary and critical examination of bites in the human subject, but a great number of purposely made and scientifically conducted experiments on animals (with the venom of Crotalus durissus) with masterly deductions therefrom, making a very complete and exhaustive examination of the whole subject—the mechanism of the bite and of the production of the venom, as well as the physical and chemical characters and poisonous effects of the venom of Crotalus durissus ; with an *exposé* of the worthlessness of the so-called antidotes also an[illegible] out the analogy of Crotalus poisoning to certain forms of na[illegible] tioning the fact of a bite having cured whooping-cough. This

in the possession of, and it ought to be well studied by, every one wishing to understand the subject of which it treats. It has been reviewed, though rather inadequately, in the *North Amer. Med.-Chir. Rev.*, v, 628, 1861.

It has afforded much of the information contained in the present essay, and the writer is otherwise deeply indebted to the kind assistance of Dr. Mitchell.

f. On the Treatment of Rattlesnake Bites, with Experimental Criticisms upon the various remedies now in use. By S. Weir Mitchell, M.D. *North American Medico-Chirurgical Review*, Vol. v, p. 289, 1861.

This is an excellent examination of the question of the effects of Crotalus venom and their so-called antidotes, showing, by an exhaustive series of experiments, that there has not yet been discovered any antidote in the proper sense of this term, the most useful substance for internal use being alcohol (which is nevertheless no true antidote), and for topical use carbolic acid or other astringent caustic by injection, to entangle the venom in dead tissue. It is a very exhaustive article, and should be in the hands of every scientific physician.

g. Experimental Contributions to the Toxicology of Rattlesnake Venom. By S. Weir Mitchell, M.D. *New York Medical Journal*, vi, 289, 1868.

This is an examination of the question of absorption of Crotalus venom by unbroken surfaces, leading its author to maintain his previous opinion that Crotalus venom, though absorbed readily by serous membranes, is not absorbed at all by the unbroken mucous membrane of the stomach. Nevertheless it is a most valuable paper.

h. Observations on Poisoning by Rattlesnake Venom. By S. Weir Mitchell, M.D. *American Journ. of Med. Sci.*, lix, 317, 1870.

This is an exhaustive examination of the effects of Crotalus venom on the blood corpuscles, leading its author to the opinion that it does not produce any great alteration in them.

i. On the Venom of Serpents. By S. Weir Mitchell, M.D. *London Medical Times and Gazette*, 1869, i, 137.

This is a kind of commentary on his previous papers, and in confirmation of his previous results.

For an able review of the three first contributions of Dr. Mitchell subsequent to his monograph, *vide British and Foreign Medico-Chirurgical Review*, xlii, 303.

j. On the Nature and Physiological Action of Crotalus Venom, as compared with that of Naja Tripudians and other Indian Venomous Snakes, &c. By S. Lauder Brunton, M.D., and J. Fayrer, C.S.I., M.D. *Proc. Roy. Soc. London*, xxiii, 261, 1875.

This is an account of an exhaustive series of experiments on animals with Crotalus and Naja venoms, confirming the otherwise well-established fact that the effects of Crotalus are more hemorrhagic than those of Naja and other Indian serpents. They say:—"We observe that there is a greater tendency to both local and general hæmorrhage and extravasation of blood and the colouring matter of blood, especially as observed in the peritoneum, intestines, and mesentery; and also probably to a more direct action on the cord, than in poisoning by either cobra or viper" (p. 263).

k. On the Differential Symptomatol[illegible] Naja Tripudians and Crotalus Pri[illegible] By W[illegible], M.D[illegible] *ish Journal of Homœopathy*, xxx[illegible] 76[illegible]).

This [illegible] . Brunton and Fayrer.

l. L[illegible] [illegible]xxix. *A Manual of Pl[illegible]* [illegible]C.P., Ed., fourth edit., [illegible], I[illegible]

The former part of this lecture is an excellent analysis and grouping of the effects of serpent venoms, including Crotalus, and is well worthy of very careful study by all who wish to understand the subject.

m. Wirkungen des Schlangengiftes, zum ärztlichen Gebrauche Vergleichend zusammengestellt, durch CONSTANTIN HERING. Allentown, Pa., A. and W. Blumer, 1837.

This is a wonderful collection and arrangement of the symptoms produced by serpent poisons, especially those of Lachesis, Crotalus, and Vipera. In this work are to be found the first properly-so-called "pathogenetic" effects of Crotalus venom. Along with the symptoms of some bites in the human subject and in dogs and cats, Dr. HERING gives (in schema along with those of lachesis, &c.) the symptoms of some provings made by Dr. WALLACE with the pure venom of Crotalus mixed with cheese and taken by the mouth, and of some provings made with the first and second triturations, taken by the mouth, by SMÖLE, LINGEN, and KUMMER.

n. Materia Medica; or Provings of the Principal Animal and Vegetable Poisons of the Brazilian Empire, and their Application in the Treatment of Disease. By Dr. B. MURE, translated from the French by C. J. HEMPEL, M.D. W. Radde, New York, 1854, Art. CROTALUS.

This article is founded on the symptoms of the case of Machado (with Crotalus horridus), v, C 29, p. 229, and those of two provings, each with one dose of the second trituration. In the first proving symptoms are registered during the twelve subsequent days, and in the second during the nine subsequent days. In these provings, at any rate in the second one, it is to be feared that many of the symptoms registered are not results of Crotalus at all; only few of them, therefore, have been incorporated in the present essay, v. p. 66, line 25, *Mure's Materia Medica.* For a review of this work v. *Brit. Journ. Hom.*, xii, 660.

o. Histoire de l'Inoculation Préservative de la Fièvre Jaune. Par NICOLAS B. L. MANZINI, M.D. J. B. Baillière et Fils, Paris, 1858.

This is a very excellant essay on the subject of yellow fever and its prophylaxis by inoculation with Crotalus venom, practised by Dr. W. L. Humboldt in the military and naval hospitals of Havana, in 1854, by order of the Spanish Government. These inoculations were evidently performed without regard to scientific requirements, for not only was too large a quantity of the venom introduced but a supposed antidote was shortly afterwards administered to modify the results. The symptoms produced are therefore of minor value for a pure Materia Medica, although many of them are undoubtedly results of the venom, v. p. 48, *et seq. ibid.*

Many of these effects are given in English by Dr. NEIDHARD in his essay on yellow fever (p. 67, *et seq.*), Bibl. IIIe., v. also *Brit. Jour. Hom.*, xix, 470, 1861.

p. Encyclopædia of Pure Materia Medica. By T. F. ALLEN, M.D. Boericke and Tafel, New York, 1876—1879, in ten volumes, Vol. iii, p. 588; and Vol. x, p. 497.

This is a collection of all information on the subject up to the date of issue, but unfortunately it is given only in schema form, in which the symptoms have been broken up, so that different parts may be placed under the different organs in which they had shown themselves.

q. Provings with the first and second triturations. By CONSTANTINE HERING, SMÖLE, LINGEN, and KUMMER. These are given in Dr. HERING's work already referred to (*m*); and translated and transferred to Dr. Allen's article in Vol. iii of his *Encyclopædia*, p. 588, &c.

r. Provings and Experiments with Crotalus Venom. By JOHN W.

HAYWARD, M.D., and ADRIAN STOKES, M.D., *Brit. Journ. Hom.*, xli, 26. Henry Turner, London.

s. Art. Serpents. By JAMES WILSON, F.R.S. Edin. *Encyclopædia Britannica*, seventh edit., xx, 127. Adam and Chas. Black, Edinburgh, 1842.

In this article Professor Wilson goes into the question of absorption of rattlesnake venom by the digestive mucous membrane, and mentions some experiments by Dr. HERING, of Surinam, in support of the fact that absorption does take place.

t. The Thanatophidia of India. By JOSEPH FAYRER, M.D., &c. J. and A. Churchill, London, 1872.

This is a large and expensively illustrated book on the venomous serpents of India, quite a *livre de luxe*. As well as examining exhaustively most of the bearings of serpent poisoning and its supposed antidotes, the author also carefully examines the subject of absorption of serpent venom by the mucous and serous membranes; and by a large number of experiments he proves that serpent venom is readily absorbed (even to the production of all the symptoms of serpent poisoning terminating in death) when exhibited by the mouth, whether pure, or diluted, or dry. He asserts: —"There can be no doubt of the absorption . . . it is capable of absorption through delicate membranes, and therefore it cannot safely be applied to any mucous surface; . . . it kills when introduced into the stomach, when put into the eye, or applied to the peritoneum; . . . there is danger in applying the poison to the lips, for it may be absorbed and evil results follow to the operator" (v. "Absorption," p. 184 of the present essay).

III. CROTALUS AS A MEDICINE—THERAPEUTIC.

a. The first person to bring into notice Crotalus as a medicine was Dr. CONSTANTINE HERING, of America, who, in 1837, published the Monograph on serpent poisons already referred to under Bibl. II:—

Wirkungen des Schlangengiftes, &c., v. Bibl. II *m.*

This essay at once raised Serpent Venoms from the position of mere deadly poisons to that of wonderful and invaluable medicines. Dr. HERING dealt principally with the venom of lachesis; but he furnished also much information on that of Crotalus and its effects, both from bites and provings, and in the treatment of disease. The evidence thus afforded showed that although the effects of Crotalus—both pathogenetic and therapeutic—of necessity bear a close family likeness to those of other serpent venoms, still they present marked generic differences; the most important difference being their *hæmorrhagic* character. He gives several cures of concrete disease, and many verifications of individual symptoms, especially of lachesis, by himself, and by Gross and others. In consequence of this, Crotalus became, in the homœopathic school, one of the most important medicines in the treatment of hæmorrhagic conditions, yellow fever, and such like diseases.

Subsequent homœopathic literature has furnished therapeutic applications of Crotalus, which show it to be a medicine of the first importance in the treatment of hæmorrhagic states, malignant zymotic diseases, septic conditions, &c. v. "*Some Symptom-Pictures of Crotalus Poisoning and some Diseases they point to.*" By JOHN W. HAYWARD, M.D. *Brit. Journ. Hom.*, xl, 243 (III *o*).

b. The next important source of information on this subject is Dr.

MITCHELL's Monograph "*Researches*," &c., already referred to, *v.* Bibl. II *e*.

In this essay, on p. 97, Dr. MITCHELL draws attention to the "*Analogy between the Symptoms of Crotalus Poisoning and those of Certain Diseases*," and says:—"I am unwilling to leave this part of my task without calling attention to the singular likeness between the symptoms and lesions of Crotalus poisoning, and those of certain maladies, such as yellow fever. . . In both diseases, for such they are, we have a class of cases in which death seems to occur suddenly and inexplicably, as though caused by an overwhelming dose of the poison. In both diseases these cases are marked by symptoms of profound prostration, and in both the post-mortem revelations fail to explain the cause of death. I have spoken, as an example, of yellow fever, but similar instances are not wanting in cholera, typhoid, and typhous fevers, and scarlatina. A second class of cases, both of Crotalus poisoning and yellow fever, survive the first shock of the malady, and then begin to exhibit the train of symptoms which terminate in more or less complete degradation of the character of the blood. Varying remarkably among themselves, exhibiting, as it were, preferences for this or that organ, all these maladies agree in the destruction of the fibrin of the blood, which their fatal cases frequently exhibit. In yellow fever the likeness to venom poisoning is most distinctly preserved, as we trace the symptoms of both diseases to the point where the diffluent blood leaks out into the mucous and serous cavities. . . It is, indeed, most probable that if small and repeated doses of the venom were introduced at intervals into the body of an animal, a disease might be produced even more nearly resembling the malady in question." And in a note he adds: "This analogy has been noted by S. S. MITCHILL, by MAGENDIE, and by GASPARD, who has also called attention to the resemblance between ordinary putrefactive poisoning, such as arises from injection into the blood of decayed animal substances, and the poisoning by venom."

c. The next source is Dr. Valdez's Thesis, *Inaugural Dissertation*. By Dr. José L. L. B. VALDEZ. Cuba, 1857.

In this brochure Dr. Valdez institutes a minute comparison between the symptoms of yellow fever and those of lachesis and Crotalus, showing their close resemblance, and giving illustrations of their curative powers in this disease.

d. *Histoire de l'Inoculation Préservative* v. Bibl. II *o*.

This is an account by Dr. MANZINI of a large amount of success in preventing and in diminishing the virulence of yellow fever by inoculation with Crotalus venom, performed in 1854 by Dr. W. L. HUMBOLDT, in the military and naval hospitals of Havanah on the ground of the great successes attending similar inoculations performed by him during the previous nine years in New Orleans, and by which he was led to the conclusion that the inoculation produces all the phenomena of yellow fever, and would therefore prove to be a prophylactic as well as a medicinal antidote to it (*Brit. Jour. Hom.*, xix, 470, 473). Much of this essay is given in English in Dr. NEIDHARD's essay, next referred to (*e*), v. p. 67, *et seq.*, and also *Brit. Jour. Hom.*, xix, 471.

e. *Crotalus Horridus; its Analogy to Yellow Fever, Malignant, Bilious, and Remittent Fevers*. By C. NEIDHARD, M.D., second edit. F. E. Boericke, Philadelphia, 1868.

This is a very good demonstration of the analogy between Crotalus poisoning and yellow fever. The author gives five cases treated with marked success in Philadelphia during the epidemic of 1853, with the 2nd and 3rd triturations. Also several cases of bilious and remittent fevers, treated with the same medicine with like success.

A review of the first edition of this work is given in the *Brit. Jour. Hom.*, xix, 468, 1861.

f. *Epidemic Yellow Fever and its Homœopathic Treatment*. By W. HOLCOMBE, M.D. Naches, Miss., 1853.

This is a very good essay on the homœopathic treatment of yellow fever, principally with Crotalus alternated with arsenicum or lachesis. It is reviewed in the *North Amer. Jour. Hom.*, iii, 465, 1853, and in the *Brit. Journ. Hom.* xii, 422, 1854.

g. On the Therapeutic Action of Serpent Venom. By RICHARD HUGHES, L.R.C.P. Edin. *Brit. Journ. Hom.*, xxxi, 114.

This is a very comprehensive and practical paper. Dr. HUGHES here points out very clearly the therapeutic sphere of Crotalus and the other serpent venoms in the treatment of disease, and furnishes illustrative cures.

h. Manual of Pharmacodynamics. By Dr. RICHARD HUGHES v. Bibl. II *l.*

In this lecture, the latter part of which is an excellent *résumé* of the therapeutical sphere of serpent venoms, Dr. HUGHES differentiates the sphere of the different serpent venoms, assigning to Crotalus that of the hæmorrhagic states. It should be carefully studied by every practitioner of specific medication.

i. Animal Poisons—a Sketch. By S. LILIENTHAL, M.D. *North. Amer. Journ. Hom.*, xvi, 497.

This is a very excellent article on animal poisons generally, and the analogy of their effects to natural diseases. Of snake poisons he gives their relationship to *decomposition of the blood* in the following order: Crotalus, vipera, lachesis, naja; and their relationship to *neuralgic states* as: lachesis, naja, Crotalus, vipera; and he then gives a comparison between their individual characteristic symptoms. Altogether, this is a very practical and useful paper.

j. Animal Poisons—a Study. By S. LILIENTHAL, M.D. *North Amer. Journ. Hom.*, xvii, 161.

This is a very good paper on the therapeutics of animal poisons, especially on septicæmia and pyæmia, and their homœopathic treatment.

k. Manual of Therapeutics. By RICHARD HUGHES, L.R.C.P. Edin. Second edit., 1877. H. Turner, London.

In arranging the therapeutic application of Crotalus, constant and extensive use has been made of this excellent manual.

l. Lectures on Materia Medica. By CARROLL DUNHAM, M.D., in two vols. Francis Hart & Co., New York, 1879. Lect. xxi, vol. ii, p. 243.

This lecture is devoted to evidence of the therapeutic value of serpent venoms, and furnishes some striking cures with lachesis.

m. Materia Medica and Therapeutics, arranged on a Physiological and Pathological Basis. By CHARLES J. HEMPEL, M.D. Third edition, edited by H. R. ARNDT, M.D. A. L. Chatterton, New York, 1880-1.

This work consists of a number of very excellent lectures on the different drugs used in medicine, with their pathogenesy and therapeutics, from a physiological, pathological, and symptomatic point of view, and should be in the hands of every practitioner of scientific therapeutics.

n. Jahr's New Manual. Translated from the German by CHARLES J. HEMPEL, M.D. W. Radde, New York, 1848.

This work supplies a great number of clinical observations and of verifications and cures by the different medicines in use at the time of its publication, and affords many very useful hints for practice.

o. British Journal of Homœopathy. H. Turner, London.

This is the oldest medical quarterly in the kingdom, having now reached its forty-first volume. Its pages are frequently referred to in the present essay.

p. North American Journal of Homœopathy. Boericke and Tafel, New York.

This is one of the oldest quarterly medical journals of America, having now reached its thirty-second volume. It is frequently referred to in the present essay.

DESCRIPTIVE.

NATURAL HISTORY.

CLASS—*Reptilia*; SECTION—*Squamata*; ORDER—*Ophidia*; SUB-ORDER—*Viperinæ*; FAMILY—*Crotalidæ*; GENUS—*Crotalus*; SPECIES—*Durissus*, *Horridus*; HABITAT—*America*; PART EMPLOYED—**Venom**, CONTRACTION, *Crt.*; SYNONYMS—Crotalophorus, Uropsophus, Caudisona. ENG., Rattlesnake; GER., *Klapperschlange*; FRENCH, *Serpent à sonnettes*.

Family—CROTALIDÆ (from *crotalon*—a rattle).—The characteristics of the *family* Crotalidæ are: a large pit between eye and nostril; tail terminating in a horny appendage; erectile fangs in front; few teeth in upper jaw; head broad behind; crown flattened; plates under tail, entire. [For a full account, see works enumerated in the Bibl. I, p. 157.]

Characters of the Genus CROTALUS.—True Rattlesnakes.—Of all serpents, the Viperinæ exhibit the most perfect degree of development of all those points of structure which distinguish the venomous from the non-venomous. And of all the families that go to make up this sub-order, none is more truly representative than that denominated Crotalidæ. And pre-eminent amongst the genera of this family for size, strength, and power to inflict injury, is the CROTALUS [Crotalophorus, Uropsophus, Caudisona]. The serpents of this genus are very properly called True Rattlesnakes; for in them the characteristics of the rattlesnake are typically exhibited:—the pit on each side of the face is very large and visible; the tail terminates in a rattle composed of from ten to twenty loose, horny rings; and the plates under the tail are entire; the head is characteristically broad behind, making it of a triangular shape and very distinct from the neck; the back part of the head is covered with scales, like those of the body; and only the front part or muzzle with plates; the mouth is very large; and the lower jaw is capable of being depressed to a right angle with the upper; the throat is very capacious; the upper maxillary bones are small, strong, and very moveable, and their muscles very powerful; the fangs are long and strong—from $\frac{8}{9}$ths to 1 inch in length, and of the thickness at their bases of a small crowquill; the body is large and powerful—from 4 to 6 or even 8 feet in length; and from 5 to 7 or even 8 inches in circumference, at its middle, tapering towards each end; the eyes are brilliant; and the general aspect is fierce, defiant, and calmly self-possessed. Their colour differs in the different species; it is usually striped or spotted with darker colour on lighter ground; and the ground colour is always lighter on the ventral than the dorsal aspect; the dorsal colour is usually reddish-yellow, yellowish-brown,

brown, tawny, or dark leaden; gradually darker towards the tail; and the tail usually black.

They are pre-eminently venomous, being little inferior in this respect to the dreaded Cobra de Capello or *Naja* of India.

This genus is found only in America, and there principally in the hot and warm regions, bounded by the limits of the temperate zones.

Characters of the SPECIES.—There are two principal species, the *Durissus* and the *Horridus*. [Other species are mentioned by authors —adamanteus, atrox, lucifer, confluentus, molussus, miliarius, consors, tergeminus, &c.]; the former is the more northern, and the latter the more southern species; the southern species—horridus—is perhaps the more deadly; and the northern—durissus—the more numerous. The climatic conditions appear to determine the general differentiating characteristics of the two species, that of the south is a rather supple-looking creature, and of a rather light colour; that of the north is firm-looking, and of a rather dark colour. The markings, too, are different; those of the *horridus* are diamonds; and those of the *durissus* spots.

Crotalus DURISSUS [called also fasciatus, banded, common rattle-snake]. The ground colour is usually brownish, tawny, or dark leaden. Along the centre of the back there is a dark line running from head to tail; and on each side of this another dark line though less distinct than the central one. On these dark lines are situated still darker spots or blotches. On the anterior third of the body the spots are generally separate from each other; on the hinder two thirds the lateral spots spread towards the centre and meet the central ones, so as to form zigzag cross-bars or irregular patches, resembling flying sea gulls.

This species is found principally in North America; mostly in the southern parts of the United States, but as far northwards as the southern shores of the great lakes.

Crotalus HORRIDUS [called also diamond-backed, terrifica, cascavella; by the Brazilians, boiçininga, boiquira; and by the Mexicans, seutla-cocauhqui, haocoatl]. The ground colour on the dorsal aspect is usually reddish-yellow, yellowish-brown, or chocolate; and that on the ventral aspect lighter yellow, or straw colour. The markings on the dorsal aspect are composed of lighter zigzag lines, running from head to tail, making three rows of diamond or lozenge-shaped spots along the back; these are smaller on the neck, larger and more distinct on the body, and less and less distinct again towards the tail; and in the central row they are more distinct than in the lateral; the tail is dark, nearly black. The scales are more deeply keeled than those of the durissus.

This species is found in South America, particularly in the northern parts: Brazil, Columbia, &c., also in Mexico and some of the southern states of North America.

One variety, the Adamanteus, attains the enormous size of eight feet.

THE MODE OF PRODUCTION OF CROTALUS VENOM.

Rattlesnake venom is a true glandular secretion. The gland that secretes it is one of the conglomerate kind, like the salivary glands. The general form of the gland is that of a flattened, almond-shaped, oval; the posterior end being somewhat

obtuse and the anterior tapering abruptly downwards to the duct, which escapes from its lower edge. It is situated inside the upper lip, reaching from about the commissure of the lips to behind and below the eye; its posterior extremity extending three or four lines beyond the commissure of the lips, its anterior end lying below and just behind the eye; it there terminates in the duct. Externally, the lower two thirds are covered only by the skin and areolar tissue of the lip, the upper third has the anterior temporal muscle between it and the skin. Internally, it is in contact by its lower edge with the external pterygoid muscle; and then, higher up, with the bony surface behind the eye; and afterwards the middle temporal muscle and the nerves that emerge under the temporal ligament (v. Mitchell's *Researches*, p. 101). The length of the gland, in a snake 4½ feet long and weighing 2 lbs. 8 oz., was $\frac{9}{10}$ths, its breadth $\frac{1}{10}$ths, and its thickness nearly $\frac{1}{8}$th of an inch. In section it resembles very strikingly a small testicle; and in ultimate structure it is very like a typical salivary gland. It is composed of secreting cells, from each of which a minute duct leads to the irregular, rounded cavity which occupies nearly the whole length of the interior, along its lower edge; this cavity abruptly contracts from above downwards, at the anterior end of the gland just beneath the eye, into the duct; and this duct passes in a tortuous course, first a little downwards and forwards, then upwards and forwards, and again forwards and downwards; and, passing outside the gum, it winds round outside to the front of the fang, where it pierces the gum from without inwards, and terminates in a papilla which projects slightly into the proximal aperture of the canal in the fang; and it is maintained in this position by the gum, which here clasps the fang with considerable firmness (v. p. 169, also Mitchell's *Researches*, p. 11).

The venom secreted by this gland accumulates in the internal cavity and in the duct, ready to be pressed out by the muscles which compress the gland during and after the act of striking; but it is retained there during the quiescent state by a kind of sphincter on the duct just where it bends downwards, and by the tortuosity of the duct. In a snake 4½ feet long, this cavity and duct were found capable of containing twenty minims of water.

QUANTITY OF VENOM STORED UP BY A RATTLESNAKE.

The quantity of venom available at one time varies with the size of the snake and the season of the year, being greater with every increase in size and every increment of temperature; and the quantity discharged at any single bite varies with the time that has elapsed since the last time the snake used its fangs. Dr. Mitchell collected fifteen drops discharged from one fang during the bite of a rattlesnake 4½ feet long, after it had been kept from using its fangs for some weeks. Thirty drops can, therefore, be discharged at one bite by a moderate-sized snake when using both its fangs; and probably much more by a large snake in hot weather after long rest. The next day the same snake threw out only two drops from each fang. Numerous observations convinced Dr. Mitchell that the venom is secreted slowly, and that a moderate-sized snake rarely throws out more than from two to four drops from each fang shortly after the first ejection (v. Mitchell's *Researches*, pp. 29, 39). After frequent and recent use of the fangs, therefore, a rattlesnake may bite without producing dangerous symptoms. After chloroforming a snake 4½ feet long that had not used its fangs for some weeks, the writer has, in conjunction with Dr. Drysdale, pressed out through each fang fifteen drops of venom; and after three weeks' rest another six drops from each fang.

CHARACTERS OF CROTALUS VENOM.

PHYSICAL CHARACTERS.—Fresh Crotalus venom is an animal substance; a clear, gum-water-looking body, which dries slowly. It is a pale emerald-green, straw-yellow, or orange-coloured fluid, resembling thick saliva. It is made or secreted and poured out by a special gland, analogous to the salivary glands, but it is not a variety of saliva. On repose, some specimens let fall a whitish sediment, composed principally of amorphous albuminous matter, which is innocuous. The *venom* is an albuminous compound, made up of several ingredients, not all of which

are poisonous, and some of which are absolutely harmless; the most actively poisonous constituent is an amorphous, yellowish-white powder, the so-called active principle, named by Dr. Mitchell CROTALINE. This *Crotaline* itself is not simple, but is an organic compound analogous to the active principle of other animal secretions, such as ptyalin, pepsin, &c. The venom is not a germinal self-propagating substance like smallpox poison, vaccine, syphilitic virus, pus, &c., but like saliva, gastric juice, pancreatic juice, &c., which are vesicular glandular secretions containing the active catalytic principles, ptyalin, pepsin, pancreatin; or like cantharis, whose active principle is cantharidin; agaricus, whose active principle is muscarin; belladonna, whose active principle is atropin; or nux vomica, whose active principle is strychnin.

MICROSCOPICAL CHARACTERS.—Under the microscope, fresh Crotalus venom is seen to contain a number of ovoid bodies, somewhat resembling minute sugar-plums, usually in groups of three, five, six, nine, &c., and in some of these, under a very high power, is seen a nucleus, in some instances connected with the cell wall by string-like bands. As the venom dries on glass it appears to crack up in rays from the circumference to the centre, like the spokes of a wheel; then the intervening spaces or spokes become cracked across, quite regularly, so that the wheel resembles a spider's web. When scraped off the glass, it has the appearance of fractured fragments of dried solution of gum arabic, of a rather darker yellow colour. Sixteen drops of fresh venom will yield six grains of dried. (v. *Brit. Journ. Hom.*, xxxiv, 220; also Frank Buckland in *Land and Water*, April 15th, 1871.

CHEMICAL CHARACTERS.—The venom of the rattlesnake abounds in albuminous matter; has an acid reaction; and has a specific gravity of about 1044; it begins to coagulate at 140° F., and is almost solid at 160°; it is miscible with cold water and with glycerine in all proportions; it coagulates by boiling and by the addition of alcohol. Pure nitric acid, hydrochloric acid, sulphuric acid, tannic acid, chlorine water, solution of iodide of potassium, of bichloride of mercury, of sulphate of soda, and sulphate of magnesia, all give a precipitate; but acetic acid, caustic potash, caustic soda, ammonia, and lime water, do not give any precipitate. Its virulence is not destroyed by dilution, by boiling, by freezing, or by drying; nor yet by keeping in a dried state. When dried it retains its dreaded power for an unlimited period of time and under great climatic changes (v. MITCHELL in *North Amer. Med. Chir. Review*, v, 278). And even fresh venom, although prone to decomposition, has also remained active after a sojourn of several weeks in an atmosphere of 65° to 75° F. (v. Mitchell's *Researches*, pp. 33, 43, 45, 59, 32; and *Brit. Journ. Hom.*, xxxiv, 220, and *Proc. Roy. Soc.*, xxiii, 264, 1875. When mixed with double its volume of glycerine, the venom will keep for any length of time.

When the venom of Crotalus durissus is mixed with water and boiled, a dense coagulum is formed, which, when well washed, is innocuous; the clear fluid remaining, however, possesses all the virulence of the original venom. If to a watery solution of the venom strong alcohol be added, a coagulum is formed; this coagulum possesses all the virulence of the venom, whilst the clear fluid remaining is innocuous. Boiling, therefore, precipitates the albumen, *minus* the active principle; whilst alcohol precipitates the albumen, *plus* the active principle. The active principle is, therefore, soluble in water, but insoluble in alcohol. In this, according to Drs. Brunton and Fayrer, the venom of Crotalus durissus differs from that of naja, for they say that the alcoholic coagulum of naja venom is innocuous, whilst the remaining solution contains the active principle (*Proc. Roy. Soc.*, xxii, 79, 1874).

When strong alcohol is added to the clear fluid remaining after the removal of the albuminous coagulum produced by boiling, a cloud of whitish precipitate is formed, and soon settles to the bottom of the vessel; when dried, this precipitate is of a pale yellowish tint, perfectly neutral in reaction, readily soluble in water, cold or hot; and its aqueous solution is troubled by alcohol, but not by boiling; it is proved to be nitrogenous by the nitrate of mercury and cupro-potassa tests. This is the active principle, and it has been named by Dr. Mitchell CROTALINE.

The venom of the rattlesnake is, then, composed of—

1. An albuminoid body—*Crotaline*—not coagulable by a heat of 212° F.
2. An albuminoid compound coagulable by a temperature of 212° F.
3. A colouring matter and an indeterminate substance, both soluble in alcohol.
4. A trace of fatty matter.
5. Salts: chlorides and phosphates.—MITCHELL'S *Researches*, p. 37.

CROTALINE.

CHARACTERS OF.—*Crotaline* is an organic compound, analogous to the active principle of other organic products, ptyalin, pepsin, pancreatin, &c.; it is a whitish-yellow, amorphous, albuminoid powder of neutral reaction; insoluble in alcohol; but readily soluble in water, cold or hot, and its watery solution is not troubled by boiling. It would probably keep well under ordinary circumstances, but it has not yet been isolated in sufficient quantity to have become an article of commerce, nor has the percentage of crotaline in ordinary venom been yet determined.

In the investigations of 1857-60, leading to the foregoing conclusions, Dr. Mitchell made use of the Crotalus durissus; but in some subsequent investigations in 1882-3, in conjunction with Dr. E. T. Reichert, he made use of the Crotalus horridus (adamanteus); and, following a different course of procedure, "Our work," he says, "has resulted in the isolation of three distinct proteid bodies, of which two are soluble in distilled water, and one is not. Of the former two, one is incoagulable at a temperature of 100° C. It may be obtained by boiling venom, which throws down or destroys all the other proteids, and then filtering, or by dialysis. The fact that this proteid remains uncoagulated by boiling and will dialyze, renders it certain that it belongs to a peculiar class of bodies which are ordinarily the result of peptic or tryptic digestion, and are known as *peptones*." And after detailing the subjecting of this body to many tests, he goes on to say: "There are certain reactions which are so novel as to give this body characteristics which will distinguish it from all others of its class. . . . But what is much stranger is that the *peptone* we have discovered is the only one as yet known to constitute a portion of a secretion, or to originate within the living body in any way except as a product of the digestion of proteids. . . . The dialyzed peptone from the *Crotalus*, when dried at 40° C., entirely redissolved upon the addition of distilled water, and is poisonous. The second proteid separated by us from the original venom solutions is quite as interesting as the peptone. . . . Its reactions indicate without doubt that it is a proteid belonging to the *globulins*, and that it most resembles *paraglobulin*. . . . After the extraction of the *peptone* and *globulin* principles, there still remains in solution a third body, which becomes turbid at a temperature of 65·5° C., and coagulates a few degrees higher . . . it is an albumen. . . . We propose for the present to call these proteids *venom-peptone*, *venom-globulin*, and *venom-albumen*." And he concludes: "Up to this date, all observers have regarded the venoms as representing a single poison. We have been able to show that the venom of the *moccasin* and *Crotalus adamanteus* contain three proteids, one analogous to peptone, and a putrefacient; one akin to globulins, and a much more fatal poison, probably attacking the respiratory centres and destroying the power of the blood to clot; and a third resembling the albumens, and probably innocent. Finally, we have learned that the poisons of the rattlesnake (*C. adamanteus*), copper-head (*Agkistrodon contortrix*), and moccasin (*Toxicopohis piscivorus*) are capable of being destroyed by bromine, iodine, bromohydric acid (33 per cent.), sodium hydrate, potassium hydrate, and as Lacerda has shown, by potassium permanganate."—*Medical News*, of Philadelphia, April 28th, 1883, pp. 470, 471, 472.

COLLECTION AND PRESERVATION OF CROTALUS VENOM.

The best method of procuring the venom is, to place within a glass bottle (sufficiently wide mouthed just to admit the head of the snake) a little carded cotton, and saturate this with chloroform; then, having secured the snake with a lasso, slip its head into the bottle and retain it there until the reptile is completely narcotized; then withdraw the head and secure one of the functioning fangs in the mouth of a well cleaned, graduated, half-ounce, glass bottle, and with the finger and thumb gently compress the gland, receiving the venom as it passes drop by drop from the point of the fang; and after having emptied the gland, add to the venom nine times its volume of pure glycerine, and cork the bottle in order to preserve the venom for future use. Empty the other gland in the same way.

Crotalus venom should be kept only in glycerine, and the 1 to 9, or 1 in 10, is the strongest preparation that should be kept. This is the preparation denominated ϕ in the *British Homœopathic Pharmacopœia*, p. 156, 3rd edit., 1882.

Glycerine is the best menstruum for preserving the venom. Alcohol is not suitable because it precipitates the active principle, and the venom being an animal substance, ought not to be trusted to keep in trituration.

A considerable quantity of ϕ was prepared by Messrs. Thompson and Capper, homœopathic chemists, of Liverpool, in 1872, from freshly-procured venom taken by the writer, Dr. Drysdale, and Mr. Isaac Thompson, of the firm of Thompson and Capper, in the manner just described, from living, vigorous snakes of the species *auritsus* then in the writer's possession.

PREPARATION FOR USE OF CROTALUS VENOM.

Crotalus venom should be kept in dilution, and for the *first* DECIMAL attenuation pure glycerine should be used, nine parts to one part of ϕ; for the *five* FIRST CENTESIMAL attenuations a menstruum of one part pure glycerine and three parts proof spirit; and for the SIXTH *centesimal* and upwards spirit twenty over proof. These are the preparations kept by homœopathic chemists.

PROPER FORMS FOR DISPENSING CROTALUS.

The *first* DECIMAL should be used in tincture only, in distilled water as a vehicle; the *five* FIRST CENTESIMALS in tincture only, either in drops or distilled water as a vehicle; and the SIXTH *centesimal* and upwards as tincture or pilules.

CONTRACTION.—*Crt.*

CROTALINE may be prepared in trituration in the ordinary way.

For dose and mode of administration, v. pp. 188, 194.

MODES OF INTRODUCTION OF CROTALUS VENOM.

Natural.—By the bite of the serpent. *Artificial.*—(1) By injection; (2) by absorption.

NATURAL MODE OF INTRODUCTION OF CROTALUS VENOM.—*Mechanism of bite.*—In the mouth of the rattlesnake the lower jaw is furnished with numerous small sharp, recurved teeth; in the upper jaw the teeth are only rudimentary, but here are situated the venom fangs, one on each side towards the front: these are about three quarters of an inch long (v. p. 164), and are curved downwards and backwards in the shape of a reaper's sickle, and very closely resemble the claws of a cat. By the base they are anchylosed to the under surface of the superior maxillary bones. Near the base in front is an opening, the entrance into the venom canal; this canal is formed by the doubling round and meeting in the middle line in front of plates of the dentine, and runs down the anterior convex surface of the fang to within about one third or fourth (of the length of the fang) from the point, where it terminates in a groove which gradually shallows off so that the point (of the fang) for about one sixth of the length of the fang is hard and round, and terminates in a very fine point, as sharp as that of a fine needle. Sometimes the plates do not meet in front, so that the canal remains an open slit. The entrance opening into the canal receives the termination of the soft membranous venom duct which, coming from the venom gland, which lies on the side of the head under the skin near the commissure of the mouth behind and beneath the eye, winds round the outer side of the root of the fang to reach this opening. There are two fixed or functioning fangs ready for use, and reserve ones in a sac or cavity behind the root of the fixed fang—six to eight in number—behind each other in different stages of growth, from a mere point to one nearly as large and perfect as the fixed one, and which latter (of the reserve fangs) is ready to supply the place of the functioning fang when it is shed naturally (which it is when the serpent casts its skin, and perhaps oftener), or is lost by accident. When quiescent, the functioning fangs lie flat against the roof of the mouth, covered by a sheath or fold of mucous membrane—the vagina dentis; but for action they are erected, by the point being thrown forwards by powerful muscles acting on the upper maxilla through the pterygoid bones. The bones concerned in this action are the pterygoids, upper maxillary, lachrymal, and frontal; the frontal bone is fixed, the lachrymal bone is moveable on it, and the upper maxillary bone is moveable on the lachrymal; the spheno-pterygoid muscle pulls forwards the pterygoid bones and these push forward the lower end of the

upper maxillary bone. By these motions the upper maxillary bone is moved as on a hinge, and the point of the fang is raised and thrown forward, describing about one half a circle, so that it is directed nearly straight forwards when fully erected. The erection of the fang is not by the fang itself being moved on the bone, but by the upper maxilla being moved and carrying the fang with it, thus gaining a greater sweep than could be gained by movement of the fang itself. The fang is pulled down again by the strong external pterygoid muscle aided by the spheno-palatine, so that the point sweeps round with a kind of hook motion into the body struck, sometimes with such force as to be released with difficulty, or to be broken off when it meets with a hard body such as bone (v. Mitchell's *Researches*, pp. 7, 8).

Manner of Inflicting the Bite.—When the rattlesnake is about to inflict a wound it throws its body into the coils so familiar to those who have seen serpents, with its tail projecting sometimes on the edge but more frequently in the centre of the coil, far enough out of the coils to admit of its vibrating freely, which it can do with singular swiftness, and which produces a sound that once heard is never to be forgotten. The head is raised a little above the rest of the body, not usually more than three or four inches, even in a large snake; the mouth is opened, the thin black tongue is jerked in and out rapidly, and by an act of inspiration the serpent makes a hissing sound; the muscles which lie upon the convexity of the bendings formed by the upper part of the snake are then suddenly and violently contracted, so as to abruptly straighten the body and thrust the head out in a direct line, either forwards or downwards or almost directly upwards. In effecting this outward thrust of the neck and head the serpent employs only the upper part of its body, and consequently is unable, under any circumstance, to strike to a greater distance than about one half its own length, whilst usually its projectile range does not exceed one third of its length. At the instant of striking—during the act, indeed—the jaws are separated widely and the head is bent somewhat back upon the first cervical vertebra, so as to bring the point of the fangs forwards into a favorable position to penetrate the opposing flesh. Concentaneously with this forward thrust of the body and opening of the mouth, the spheno-pterygoid muscles act from their firm cranial attachments to draw forwards the pterygoid bones, and thus, through their attachment to the maxillary bone, erect the fangs.

The function of elevating the fang belongs exclusively to the spheno-pterygoid muscles, which have no analogue in any animal destitute of venom fangs. That the mere act of opening the mouth of necessity raises the weapon has often been affirmed, but it is only necessary to separate the jaws of a living rattlesnake to be convinced that this is not the case, and that, even when the mouth is widely opened, the reptile has the most perfect control over the movement of the fangs, to raise them or not as it likes.

As the fang is thrown forwards and raised, the cloak-like fold of mucous membrane—the *vagina dentis*—is thrown from its convexity and gathered into loose folds at its base, thus exposing the naked fang with its canal, tube, or open slit as the case may be. As the unsheathed fang—sometimes three quarters of an inch long—penetrates the flesh of the victim, the muscles of the neck draw violently on the head, the external pterygoid and sphenopalatine muscles draw the point of the fang violently backwards, so as not only to drive the fang more deeply into the flesh but also to pull the wound open, whilst the temporal muscles draw the lower jaw forcibly upwards, and at the same time compress the gland and drive the venom forwards through the fang and out in front of its point into the cavity of the wound, the bottom of which has been thus pulled open to receive it. The whole process is the work of but an instant, and the serpent's next effort is to disentangle itself from its victim, which it does by reopening its mouth and shaking its head. The same serpent may inflict several envenomed wounds in rapid succession, for the glands are not necessarily emptied during the first act; still, as the venom is but slowly formed, each successive wound is likely to be less dangerous; this is, however, not necessarily always the case, because, although rattlesnakes do usually employ both fangs at once, they not unfrequently use only one at a time, and inflict a wound with the other at a subsequent stroke, so that the second wound, at any rate, may be as dangerous as the first. This ability to use the fangs separately is provided for by the bones and muscles of the two lateral halves of the upper jaw being somewhat independent of each other. Not every act of striking is, however, necessarily effective, for, as the functioning fangs are fre-

quently shed, they may be lost or absent at the time of the act; nor even if they are in their proper places is it absolutely necessary that they are properly used to inflict a dangerous wound. There are always these liabilities to uncertainty. Also, the mere act of opening the mouth does not of necessity raise the fang, nor does the act of closing it of necessity compress the gland and discharge the venom. The mouth has to be opened and closed in order to take food, and it would not have been in accordance with the wisdom of Nature to make one act involve the other; the acts of taking food and of inflicting an envenomed wound are two perfectly distinct acts, and both quite under the control of the will of the reptile, which has perfect control over the fang to use it or not as it likes. Moreover, there are special provisions for preventing the discharge of the venom during the act of deglutition: the duct of the gland is provided with a sphincter, is very tortuous, and is made to wind round the root of the fang, whilst the fang itself is made to lie inactive against the roof of the mouth (v. p. 166); the nerves, too, of the venom gland are distinct from the gustatory nerves. The power with which the venom is ejected from the fang is sometimes very great, it has been known to be thrown to a distance of five or six feet (v. Mitchell, *Researches*, pp. 20—24.)

Treatment of Persons Bitten.—The *first and immediate* OBJECT IN VIEW is to prevent the venom from entering the blood and being carried into the system, and the *first* THING TO BE DONE, therefore, is to put a ligature tightly round between the wound and the heart. The *second* OBJECT is to remove from the wound as much of the venom as possible, and therefore the *second* THING TO BE DONE is to excise the part, or to dry cup, suck, or scarify it, and promote bleeding and exudation, as by cupping glasses. Or if, from the locality of the wound, these be impossible, then the *third* THING TO BE DONE is to destroy as much as possible of the venom that is within the wound by red-hot iron, such as a knitting-needle thrust deeply into the punctures several times; and failing this, by the injection into the wound of one of the astringent caustics, such as the mineral acids, carbolic acids, nitrate of silver solution, permanganate of potash, sanitas, &c.

At the same time it should be borne in mind:—1. That when the fangs have been well driven into the flesh the traction on the fang by the muscles of the serpent's head will have pulled open the deep parts of the wound so that a large quantity of venom may have been deposited within the wounds, though the external punctures may appear only like needle pricks. 2. That part of the venom is immediately taken up by the blood, blood-vessels, and absorbents, and inevitably carried with the blood to the heart, and again driven throughout the system within one or two minutes, more and more being taken up and served in the same way every instant. 3. That a great part of the injected venom lies for some time within the wound, soaking into the tissues or being taken up by the protoplasm along with its pabulum, as well as being taken up by the vessels and carried to the heart. 4. That what is taken into the blood is carried straight to the heart and then driven through the lungs, and is thereby submitted to the oxidising processes going on in the lungs, and so is in part destroyed. 5. That what escapes the pulmonary oxidation is, by the left heart, driven through the system in the circulating fluid, and is in part appropriated by the protoplasm, and is thus partly destroyed by this vital act, as well as in part itself at the same time perverting the vital action and destroying the tissues. 6. That the more vigorous the vital processes—the stronger the *vis medicatrix naturæ*—the less can the venom pervert them and the more can they destroy the venom, and therefore (7) that alcohol, ether, and ammonia taken internally (not applied externally), may be expected to be beneficial, not by destroying the venom, but by stimulating and increasing for the time the rapidity and strength of the vital processes, and sustaining the vital action in its struggle with the venom—"vital antagonism." 8. That it has been proved that the caustic *alkalis*, potash, soda, and ammonia, mixed with the venom of Crotalus durissus, do not destroy its virulence, and that therefore it is useless to apply any of these topically, or inject them into the wound with this object, indeed, that it would be injurious to do so because, by their softening and dissolving effect on the tissues, they would hasten absorption; whereas, from the coagulating effect on the tissues by the mineral acids, carbolic acid, chloride of lime, and other *astringent* caustics, *their* injection into the wound might entangle the venom in some of the destroyed tissue and so contribute to prevent its absorption. 9. That even after the venom has, to a certain extent, already perverted or destroyed the vital processes of *the part* (local

effect), the *vis medicatrix naturæ*—even unassisted by external aid—may not only arrest the progress of the perversion, but restore the normal action of the part—"local vital antidotism." 10. That if the venom has already deranged or partially perverted the vital action of the *whole organism*, the *vis medicatrix* may, even unaided, restore the normal action and thus bring about restoration to health—"general vital antidotism." 11. That even if the unaided *vis medicatrix* be not sufficient of itself to restore the normal action, there are medicines that have power to help it; such are cantharis, apis mellifica, tarantula, rhus, phosphorus, arsenicum, secale, ipecacuanha, arnica, ailanthus, belladonna; these therefore should be exhibited internally, according to the symptomatic indications present—"general medicinal antidotism. And, 12, that even locally the *vis medicatrix* may be helped in its struggle with the poison and with the partially decomposed structures, by local injection into the wound or into the neighbourhood of the wound, of one or other of these same medicinal antidotes. So that after excision, burning, or injection of the astringent caustics, frequent injection should be practised with one or other of these medicinal antidotes before slackening or removing the ligature, and for some time afterwards—"local medicinal antidotism."

ANTIDOTES TO CROTALUS VENOM.—*A. chemical.*—A chemical antidote is an agent (1) which, being mixed with the venom *before introduction*, combines with it and renders it insoluble or unabsorbable. But this is not properly an antidote at all; because, in this case, the venom as such is not introduced, but a third and different body. Such are (at least as to the venom of Crotalus adamanteus) bromine, iodine, and potassium permanganate.

(2) An agent which, being introduced *simultaneously* with or immediately afterwards, into the same locality or the immediate neighbourhood, meets there with the venom or a great part of it and, combining with it, renders it insoluble, unabsorbable, or innocuous before it has been taken up; so that the small quantity that has already passed into the system is insufficient to produce fatal results. Such, for instance, is the red-hot iron, and (at least as to the venom of Crotalus adamanteus) bromine, iodine, and potassium permanganate.

(3) An agent which, being introduced into the blood *after* the venom, meets with the venom in the blood and there combines with it and renders it innocuous, insoluble, or unabsorbable. Such, according to Dr. Lacerda, is potassium permanganate with respect to naja venom (which, however, is denied by Sir Joseph Fayrer, *Lancet*, April 28th, 1883, p. 729); but, according to Dr. Mitchell, it is not such with respect to Crotalus venom; neither is carbolic acid, nor the hypophosphites, nor sanitas, nor chlorine water, nor, indeed, any other of the usual antiseptic agents (v. *Medical Times and Gazette*, 1869, vol. i, p. 137; also Bibl. II i).

B. Physiological.—A physiological antidote might be viewed as an agent which has a specific affinity for the same structures of the body—the same protoplasm—as the venom has, and on being introduced *simultaneously with* or immediately afterwards, acts on the same protoplasm in an antagonistic way, either directly on the atomic structure of the protoplasm, or indirectly through the antagonising nerve-supply (excito-motor and inhibitory ?), and so prevents the venom from producing its evil effects—antagonises or counteracts. Such, for instance, are belladonna to opium, atropine to morphia, curare to strychnia; and such are alcohol, ether, and ammonia to Crotalus.

C. Medicinal.—A medicinal antidote might be viewed as an agent which has a specific affinity for the same protoplasm as the venom has, and being introduced after the venom has produced its evil effects, but not to a fatal degree (has perverted but not destroyed, or only to a small extent, the normal action of the structures), acts on the same protoplasm either directly on the atomic structure of the protoplasm itself, or indirectly through the same nerve supply, in a *similar* (not same) way, alters the morbid action just a little, and so allows the *vis medicatrix* to restore the normal action of the part. Such, in the case of Crotalus, are the other serpent venoms and the insect venoms; also rhus, phosphorus, arsenicum, secale, ipecacuanha, arnica, ailanthus, belladonna, mercurius, and such-like medicines.

ARTIFICIAL MODE OF INTRODUCTION OF CROTALUS VENOM.—With the object of obtaining more precise information on the effects of Crotalus poisoning than is afforded by the results of the natural mode, bites, various methods of artificial introduction have been made use of.

A. Some of these have had for their object the showing (1) the mode of death;

(2) the quantity required to bring about death in different animals; and (3) the length of time required for this purpose, with different quantities of venom, and in different animals.

B. Others have been designed to show (1) the pathological states produced by quantities short of fatal dose; (2), the organs and tissues on which the venom principally expends its morbific energy; and (5) the general character of the symptoms produced.

C. Whilst others have been designed to bring out (1) the finer shades of the effects of the venom—its pathogenetic symptoms, objective and subjective, absolute and contingent; and (2) to illustrate its effects on the mind—the disposition and intellect.

A and B. To accomplish the first and second of these purposes the usual plan has been (1) to expose an animal to an irritated serpent, confined in a box or frame or held in the hand, until it struck the animal once or twice. (2) In some instance a large fresh serpent was employed, or one in which the venom had been allowed to accumulate, so as to insure the injection of a large quantity. 3. In others a small serpent, or one that had recently used its fangs, so as to diminish the quantity of venom injected (v. **C** and **Ca**, pp. 211, 237); and (4) in others, again, some venom has been collected and a definite and known quantity, either pure or diluted with water, has been injected subcutaneously, or into a serous cavity, or directly into a vein (v. Physiological Experiments, **B**, p. 202; also Brunton and Fayrer, Bibl. **II** j, and Mitchell **II** f).

C. To accomplish the third object (1), a definite and known quantity of the venom, diluted, has been introduced either subcutaneously or by the mouth or other mucous or serous entrance, and the effects carefully watched and recorded (v. **B**, p. 202); and (2) the ordinary infinitesimal dilutions or triturations have been employed in specific provings, as with other drugs (v. Provings, **A**, p. 195).

Crotalus venom has, in fact, been so made the subject of careful observation and scientific experiment, that the sphere of its operation has been accurately and completely made out, and its place and power as a therapeutic agent accurately defined; that is, its toxicology, pathogenesy, and therapeutics have been well ascertained; and its toxic, pathogenetic, and therapeutic doses satisfactorily determined.

TOXICOLOGY OF CROTALUS VENOM.

The venom of the Crotalus is inimical to animal life in all its grades; to that of cold-blooded as well as of warm-blooded animals; and to that of its own genus, if not of its own species. And its fatal effects are almost equally rapid and certain in all kinds of animals, as well when introduced artificially as when administered in the natural way by the serpent itself; and not only when it is in its natural liquid and fresh state; but after having been dried, or boiled or (at least the durissus), frozen, or mixed with strong mineral acids, or alkalis, or other chemical reagents (v. Chemistry of the Venom, p. 167).

Rapidity of Operation of Crotalus Venom. (1) *In Bites.*—The lethal operation of this substance is so swift as sometimes to defy observation of the resulting phenomena; resembling, in this respect, the poisons of Asiatic cholera, yellow fever, scarlet fever, and smallpox, and even prussic acid. Instances have been reported of big, healthy, strong, muscular men dying within a few minutes after having been bitten (Fayrer's Thanatophidia, p. 17, 1st col., note). In one of the cases recorded in the present essay—that of Dr. Wainwright, v. Bites **C** 30—death took place in five hours and a half. And many instances are on record of dogs, rabbits, and guinea-pigs dying within a minute; of pigeons dying within half a minute, and of small birds within a few seconds (v. Bites, **Ca**, p. 237). And when death does not follow immediately, the changes the venom produces in the living body are sometimes so swift as to have progressed to the stage of mortification at the place of introduction within a few seconds; and to the extent of a profound putrefactive change of the whole mass of the circulating fluid within a few minutes.

(2). *In experiments.*—Evidences of the operation of Crotalus venom are generally manifested immediately, or within a minute, in the usual modes of experimentation—whether the venom be injected into a vein, as in experiment **B** 14, 15, or under the

skin as in experiment **B** 1, 2, 3, 12; or into the peritoneum, as in **B** 10, 11; or applied to the mesentery, as in **B** 7, 9; or thrown into the trachea, as in **B** 4, 5; or applied to muscle, as in **B** 6, v. p. 202.

(3) *In Provings.*—Some of the symptoms may come on immediately or within a few minutes, especially the nervous pains and particularly in throat and brain. v. Provings, **A** 2, 3, 4, p. 195—201.

CHANGES PRODUCED BY CROTALUS VENOM.—The changes the venom produces in the blood and tissues are so rapid and destructive as to be an unending source of wonder, even to one who by daily observation has become familiar with them. The effects on animal life of Crotalus venom in very large doses, strike the beholder with amazement; they are truly frightful; and only to be paralleled by the zymotic diseases in their most malignant form. Crotalus venom is, indeed, a septic or putrefacient poison of astounding energy; probably not surpassed by anything in the whole list of poisons. In some instances decomposition is so rapid and destructive at the locality of the bite, that within a few minutes the skin has already become mortified; and within a few hours the tissues, to a considerable depth, have become almost fluid with decomposition, and literally soaked with fluid blood; and the blood throughout the whole body has become profoundly changed in character, so that, even before death, it has lost entirely its power to coagulate; and immediately after death is found perfectly diffluent throughout the body (v. below, also Bites, **C** 26—31, and **Ca**, 5 a).

EFFECTS OF CROTALUS VENOM ON MUSCLE.—The influence of Crotalus venom on muscular structure is extremely curious. The wounded muscle begins immediately to tremble, quiver, or twitch; and in a very short time it becomes soft and very easily tearable, even in the living body. After long contact it becomes almost diffluent and assumes a dark colour and a jelly-like appearance, and under the microscope has the appearance of a minute granular mass, dotted with larger granules. Muscular irritability is lost sooner than after any other mode of death (v. MITCHELL'S *Researches*, p. 80, Bibl. II e).

ACTION OF CROTALUS VENOM ON NERVOUS SUBSTANCE.—The effect of Crotalus venom on the nervous system is to paralyse the nervous centres, so as to prevent impressions on the sensory nerves from being transmitted to the motor nerves; leaving the nerves themselves still irritable and responsive to stimuli. Topical application of the venom to the nerve trunks does not appear to produce any marked change in their structure or functions.

THE EFFECT OF CROTALUS VENOM ON THE BLOOD.—In "acute cases," that is, when death takes place immediately or within a few minutes, if examined immediately after death, there does not appear to have been any detectable alteration produced in the appearance or the structure of the blood; though it is extremely probable that a very real change has been produced—sufficient to be fatal to the animal, though not appreciable by our means of detection. In "sub-acute cases," however, that is, when death has been delayed a few hours, very evident and grave structural changes are easily discernable, notably in the destruction of fibrin. So diffluent, indeed, does the blood become in some cases, that it may be poured from vessel to vessel like water. Even during life the blood loses entirely its power to coagulate; and its corpuscles lose their power to arrange themselves into rouleaux; and its colour becomes dark, even in the left side of the heart (v. MITCHELL'S *Researches*, p. 94). In a case given by Dr. Mitchell "the dog survived very serious visceral lesions and lived through two days with its blood in a condition of complete diffluence (v. **Ca**, 5 a). If the blood of a healthy animal be mixed with the venom the state of diffluence attained within twenty-four hours is such as usually takes several days of warm weather to produce.

ALTERED RELATION BETWEEN THE BLOOD AND TISSUES.—"Amongst the most constant and the most curious lesions in cases of secondary poisonings," says Dr. Mitchell, "are the ecchymoses which are found on and in the viscera of the chest and belly; most frequently affecting the intestinal canal, they may and do occur in any cavity and on any organ; . . . this leakage of the blood into the serous cavities and areolar interspaces is plainly due to the loss of coagulating power in the blood, or to alterations in the vascular tubes or to both. . . It seemed to me that however various the seat of the affection, it was in all organs and tissues alike in its character. In other words, owing to the changes in the blood or tissues, or both,

extravasations are met with in the lungs, brain, kidneys, serous membranes, intestines, and heart. As a result, we have functional derangement grafted on the main stem of the malady, and the accompaniments of bloody serum in the affected cavities, bloody mucus in the intestinal canal, and bloody urine in the bladder" (*Researches*, pp. 94, 95).

MODE OF DEATH BY CROTALUS POISONING.—The phenomena preceding and accompanying death in Crotalus poisoning, and the duration of life after the introduction of the venom, are not the same in any two fatal cases; but, for facility of study they may be arranged under three classes, viz.:—1. By *Primary Shock* through the nervous system—ACUTE CASES. 2. By *Primary Blood-poisoning* through the direct putrefacient influence of the venom on the blood and tissues: in this case the respiration and circulation are the first to fail—SUBACUTE CASES. 3. By *Secondary Blood-Poisoning* from absorption of the decomposed structures: in this case the general vital powers become exhausted—CHRONIC CASES.

The following descriptions refer to typical cases of each class:

1. *Acute Cases.*—The first mode of death, that by primary shock, is shown when a relatively *very large* quantity of the venom has been introduced, as is the case when a large, fresh, vigorous snake bites a small or weakly animal, and death follows within a few seconds or minutes. In these cases, immediately on being struck the animal staggers, falls, and dies, sometimes in convulsions, almost as if from prussic acid or an overwhelming dose of Asiatic cholera, yellow fever, smallpox, or scarlet fever poison, and death takes place before there has been time for symptoms to be observed or to become developed. There may sometimes be a sudden cry, as of terror or pain, and there may occasionally be observed a shudder of the whole frame, and perhaps an effort to vomit; but the lethal operation of this substance is so swift as sometimes to defy observation of the phenomena that occur between the introduction of the venom and death. A child, aged two years, died within fifteen minutes after having been bitten on the cheek, though the wound was sucked immediately by the child's mother. (*v.* C 27, p. 226.)

When examined immediately after death in the most acute cases, the tissues and fluids in the neighbourhood of the wound are found apparently unchanged; the blood throughout the body is still retained within its proper vessels, and is red and perfectly coagulable, and its corpuscles are ideally healthy; nor is there any change discoverable in the brain or nervous system. Death occurs before any discoverable structural changes have had time to take place, but general decomposition and deliquescence follow very speedily after death. In the less rapidly fatal acute cases the course of the phenomena is somewhat different and less obscure, varying of course with the length of time death is delayed; and if death does not soon follow, the changes the venom produces in the living body are sometimes so swift as to have progressed to the stage of mortification at the place of introduction within a minute, and to the extent of profound putrefactive change of the whole circulating fluid within two or three minutes (*v.* p. 173).

2. *Subacute Cases.*—The second mode of death, that through the blood, is shown when the quantity of venom introduced has been large, but not sufficient to produce death by shock, as when a large or fresh snake has bitten a moderate-sized or vigorous animal, and death has not followed for some hours or even days.

In this case the parts in the neighbourhood of the wound almost immediately become swollen, blackened, and softened, indeed partially mortified; and the blood throughout the body soon loses its power to coagulate [perhaps rather from alteration in the fibrin already existing than from check in the formation of new fibrin—MITCHELL], and the blood-vessels lose their power to retain within them the circulating fluid [perhaps as much from softening of their walls as from loss of power in the vaso-motor nerves], so that the blood passes through their walls almost everywhere throughout the body, producing hæmorrhages from almost every surface and into almost every organ and tissue of the body, forming in the skin and subcutaneous connective tissue enormous livid swellings resembling phlegmonous erysipelas or diffuse cellular inflammation, and which, if life be sufficiently prolonged, do afterwards inflame and terminate in mortification and sloughing, even of parts at a distance from the wound (*v.* C. 21, 22, 23, 33). When examined after death the blood is found dark and perfectly diffluent throughout the body, and to have escaped from its proper vessels into the surrounding tissues; and the muscles throughout the body, including

the heart, the blood-vessels, and the muscles of respiration, are found softened and threatened with mortification; in fact, general decomposition and deliquescence appea. to have begun even before death took place (v. Ca. 5 a).

In consequence of these changes in the blood and blood-vessels and the muscles of respiration, death in these cases is preceded by extreme debility and prostration, with delirium, stupor, cold perspiration; and by difficult, rapid, irregular, jerking, intermittent, or slow, long, stertorous and laboured breathing, and perhaps pain in the chest, especially of the cardiac region, and there is a sensation of smothering, as if the blood were producing suffocation or the lungs were extensively congested. The pulse is small, thread-like, quick, weak, soft, tremulous, fluttering, irregular, intermittent, and scarcely perceptible, and on attempting to stand or walk paleness of the face with a tendency to syncope are apt to occur, principally from the weakened and oppressed circulation and respiration, partly also perhaps from the non-oxygenated and disorganised state of the blood. The symptoms and structural lesions will, of course, vary with the duration of life, whether hours or days, after the introduction of the venom (v. C. 5, 6, 10, 15, 22, 26, 28, 33).

3. *Chronic Cases.*—The third mode of death, that by secondary blood-poisoning, results when the quantity of venom introduced has not been sufficient to paralyze the nervous centres, or to disorganise the blood and tissues to the extent of rendering them incapable of carrying on the vital operations, but still large enough—as when a moderate-sized or tolerably fresh snake has bitten a large or vigorous animal—to produce partial disorganisation of the blood, along with great general debility and exhaustion, as well as localised disorganisation, mortification and sloughing, sufficiently extensive and prolonged to waste the vital powers beyond endurance, or by absorption of their products to produce secondary blood-poisoning, with septicæmic abscesses and other reinfecting products.

These cases may, and generally do, for some hours or days, present many of the general and topical symptoms of the *primary* blood-poisoning, but these pass off, at least in part, whilst the local structural lesions, or most of them, remain and increase. The bitten limb becomes enormously swollen and very painful, and the swelling extends to the trunk, much after the manner of phlegmonous erysipelas or diffuse cellular inflammation. Inflammation afterwards supervenes in the swollen parts; vesications form on the skin and sloughs among the muscles; the parts become greenish or mottled, or blackish, and softened or œdematous, resembling diffuse cellular inflammation from dissection wounds. The gangrenous parts slough to the bone, and perhaps even the bone itself becomes involved before death. The foul discharges are in part taken up into the circulation, secondary blood-poisoning results, and secondary abscesses are formed in different parts, with brown unhealthy pus. Hectic fever supervenes, accompanied by great thirst and total want of appetite. There may be hæmorrhages from any and every organ and mucous surface of the body, with deep-seated accumulations of disorganised blood, as in leucocythæmia, with bloody vomiting, stools, and urine, and perhaps jaundice and general degradation of the blood and tissues; and the patient dies, worn out with the secondary constitutional effects, perhaps at the end of the first or second, or even third or fourth week (v. C. 22, 23, 24, 33).

Cause of Death in Crotalus Poisoning.

The proximate cause of death in poisonings by Crotalus venom differs in the three "modes of death;" that is, when death takes place (1) with symptoms of shock—acute cases; (2) with symptoms of blood-poisoning—subacute cases; and (3) with symptoms of hectic fever—chronic cases.

1. *Primary Shock.*—When death takes place suddenly and at once after an injection of the venom, the immediate cause is shock to the nervous system—paralysis of the nervous centres—which puts a stop to innervation and reflex action; it is an arrest of the production of nerve force in the nervous centres, analogous to failure of activity in an electric battery, and there is sudden loss of vitality by the blood, and of motor power by the heart, with sudden stoppage of the circulation and respiration, like what occurs in death by prussic acid. This mode of death is also more likely to follow after the venom is thrown directly into a large vein.

2. *Primary Blood-poisoning.*—When death is delayed a few hours or days the imme-

diate cause is, primarily, the devitalised state of the blood, and, secondarily, failure of the circulation and respiration. Putrefactive change in the blood begins, indeed, immediately on the injection of the venom, and proceeds with astounding rapidity throughout the whole mass, destroying its power to coagulate and to nourish the tissues or maintain life. The heart, struggling under the directly softening and enfeebling influence of the venom, aided by its own defective nourishment by the impoverished and partially decomposed blood, gradually ceases to have power to propel this (to the tissues) unattractive fluid. The capillary circulation is impeded by the want of attraction between the blood and tissues, dependent partly on the defective character of the blood and partly on the defective power of the cells or small corpuscles of germinal matter to attract the blood by abstracting from it the nourishment they require. There is defective formation of protoplasm, partly from the impurity of the pabulum presented to the cells, and partly from defective power of appropriation within the cells themselves. The venom is taken up in or with the pabulum into the small masses of germinal matter—the corpuscles or cells—and perverts or arrests their normal appropriation or growth.

3. *Secondary Blood-poisoning.*—When death is postponed for some days or weeks the immediate cause is failure of vital energy, exhausted vital power, inability of the vital force to continue work any longer under the strain it has to bear, aided by the obstruction by the effete matter in the blood and the defective appropriation by the enfeebled cells or masses of germinal matter, so it breaks down under the load, metabolic action ceases, and life comes to an end.

The nervous system had rallied from the primary shock, and the blood from the decomposing influence of the venom, the circulation and respiration had recovered their power to circulate and somewhat revivify the blood, and the tissues had somewhat regained the power to appropriate the partially-regenerated blood; but the local lesions—the inflammation and suppuration, mortification and sloughing, with absorption of the resulting sanies—bring about secondary blood-poisoning—secondary infective absorption, with hectic fever—and death follows in the same way as it does from any other form of putrid infection—from dissection wounds, carbuncles, and the like.

The Wound.—In the bite of a large serpent the fang sometimes penetrates to the depth of three quarters of an inch, though generally not so deeply. It is equally fatal whether on the trunk or on an extremity, but more rapidly and surely in proportion to the vascularity of the part; somewhat slowly and uncertainly when made into a merely adipose tissue, as in the pig. The local quivering, which is so common, appears to depend upon the muscles of the part having been wounded and envenomed. The swelling, which in the great majority of cases surrounds the wound, is not inflammatory in the first instance, but is due to the effusion of blood and serum, which will sometimes leak out of the wound in a continuous stream. In cases not speedily fatal, however, secondary inflammation, followed by suppuration or mortification, does generally supervene.

Topical Effects.—These may be divided into those from "Bites," and those from "Experiments."

1. Bites.—In rattlesnake bites some of the topical effects show themselves immediately, others only afterwards; they are altogether absent in really acute cases, and are only slight after injection of the dried venom, or venom that has been boiled or subjected to the influence of chemical reagents, and when injected merely into adipose tissue, also after poisoning by Crotaline.

1. The *immediate* topical effects are usually pain and swelling, and, if the wound be made into a muscular part, quivering; if into a vascular part hæmorrhage and discoloration; and sometimes a sensation of coldness or actual coldness, or burning sensation or actual heat.

2. The *later* topical effects are swelling, softening, blackening, and disorganisation of the blood and tissues of the part; and later still, in chronic cases, inflammation, suppuration, gangrene, mortification, sloughing.

Pain.—Pain is a very common result: in some instances it comes on immediately, in others only afterwards. In some cases the animal howls out the moment it is bitten, suffers terribly, and whines and yells incessantly. The immediate pain may result principally from the laceration of the structures of the part, and partly from the contact of the venom with the lacerated nerve fibrillæ; and partly, also, perhaps

from the specific effect of the venom itself. Immediate pain does not occur in all cases. Pain is, however, always present during the subsequent swelling and disorganisation of the parts in subacute and chronic cases, and is sometimes very excruciating and very persistent. This secondary pain results principally from the swelling, and from the pressure exerted by the effused fluids; and, perhaps, also somewhat from the disorganising process going on amongst the tissues.

SWELLING.—Swelling is almost a constant result; it comes on in some cases immediately: it is usually great, and frequently enormous. The immediate swelling results from the escape of blood into the structures of the part, and is more immediate and extensive the more soft and vascular the part wounded. Its continuance and increase result from continued oozing of serum and disorganised blood, and the infiltration of these into the surrounding tissues. It sometimes extends to a considerable distance from the wound; from the hand, for instance, up the arm, over the shoulder, and down the trunk as far as the pelvis; or from the foot up the leg and the side of the trunk, and even across to the opposite side. The parts assume an œdematous, brawny condition, such as is seen in cases of diffuse inflammation of the areolar tissue from other septic poisons.

HEMORRHAGE, EXTRAVASATION, AND DISCOLORATION.—In all cases *hemorrhage* occurs, both immediately and secondarily, if not externally, at least into the tissues. The immediate hemorrhage results from the laceration of the vessels by the fang; and the blood may then be bright and coagulable. Nearly always, however, hemorrhage continues for some hours, and the blood is then dark, fluid, and incoagulable. The continuance and increase of the hemorrhage result from the fluidity of the blood within the vessels and the softened and disorganised vascular walls and structures of the part, so that the vessels give way and the blood escapes amongst the tissues. Blood will sometimes flow from the wound drop by drop; occasionally in a continuous stream. The wound becomes surrounded by *extravasated* blood, and the tissues sometimes become literally soaked to a considerable depth and distance with dark fluid blood, and sometimes fluid blood accumulates in large masses amongst the structures of the part, and even at a distance, as in leucocythæmia.

The *discoloration* results from the effusion of blood into and underneath the skin; and its extent and intensity correspond with the quantity and character of the effusion and its nearness to the surface. In some cases it will extend over the entire limb, and even part of the trunk. It sometimes comes on immediately, and is then rather bright; it is, however, most pronounced after some hours, and may then be livid or even nearly black. In non-fatal cases, after a few days, like other ecchymoses, as it disappears it changes through different degrees of green and yellow; or it may be green or yellow from the first. It has frequently been described as resembling the colour of the rattlesnake itself. It will sometimes persist for weeks or months; and may reappear periodically for years (v. C. 9, 13, 16, 18, 19, 20, 21, 25).

QUIVERING, TWITCHING.—One of the most certain effects of the introduction of Crotalus venom is muscular twitching. It is almost sure to occur when the wound is made into muscular structure, and in guinea-pigs even when the venom is injected into the subcutaneous tissue or applied to the peritoneum. When the envenomed wound is made into muscular structure, the muscles in the immediate neighbourhood, and, indeed, sometimes throughout the entire limb or the whole body, tremble, quiver, or twitch in a most remarkable manner and for a considerable time, and in some cases even for some minutes after death. This is a very constant topical effect in birds, rabbits, and dogs; but it has not been very frequently noticed in the human subject, perhaps from the muscles being so much under mental control, or from the topical treatment made use of, or from the ligature, or it may have been masked by the swelling. Muscular irritability is lost sooner than after death from any other cause (v. "Effect on Muscle," p. 174, also Ca 5, 6, 7, 8, 27, 28, 29).

STRUCTURAL CHANGES.—Crotalus venom being an extremely energetic septic poison, it immediately sets up fermentative change in the structures surrounding the wound into which it is injected; involving in this catalytic change the blood, the vessels, the muscles, the areolar tissue, and, indeed, all the animal substances of the part; the whole are speedily involved in one and the same process of disorganisation and decay. The structures wounded and those in the immediate neighbourhood become softened, blackened, and decomposed. The blood loses its power to coagu-

late, becomes dark and diffluent, and oozes through the vascular walls, which, themselves softened and decomposed, give way to the pressure of the blood within them. The muscles of the part tremble and quiver under the disorganising influence; soften, and become deliquescent. Vesications form on the surrounding skin, which itself becomes soft and gangrenous; local inflammations supervene, followed, perhaps, by gangrene and mortification, suppuration, or abscess, with dirty-looking, unhealthy pus. These disorganising changes eventually, in some cases, involve the whole body, so that death is brought about by general decomposition.

II. EXPERIMENTS.—The topical results from the milder applications of Crotalus venom, such as injection and scarification, are the same in kind as those from bites, but less severe, viz. hemorrhage, extravasation, swelling, pain, twitching (v. Experiments, B, p. 202.

General or Constitutional Effects.—These may be divided into those from Bites; those from "Experiments;" and those from "Provings."

I. *From* BITES.—In order the more easily to appreciate and comprehend the constitutional effects of *Crotalus* Poisoning, it will be advisable to study them under three general classes, viz.: 1. *Mild cases*, or such as recover within a few hours (acute fatal cases evolve few or no constitutional effects, v. "First Mode of Death," p. 175). 2. *Severe cases*, or such as die or recover within a day or two and before the supervention of inflammation. 3. *Prolonged cases*, or such as survive a sufficient length of time to allow reactive inflammation to take place.

1. *Mild Cases.*—In cases in which recovery takes place within a few hours the first constitutional effect is usually an immediate and sudden feeling of giddiness, or nausea, or faintness, or all three, perhaps followed very shortly by vomiting and great failure of strength, with sensation of coldness in the bitten limb or the whole body, and these perhaps followed by perspiration. The countenance becomes anxious and depressed; the mind usually wanders somewhat; the pulse becomes rapid, soft, small, feeble, perhaps tremulous, irregular. The respiration becomes anxious and hurried, perhaps laboured, irregular, or jerking. There may be sensation of constriction in the throat and chest, with an oppressed feeling about the heart. In cases somewhat less mild the speech and deglutition may become difficult, the tongue may swell, and there may be considerable thirst. The sight, hearing, and taste may become perverted, and some hemorrhage may take place from some of the mucous surfaces, such as the eyes, nose, mouth, gums, kidneys, bowels, and rigors may occur or burning sensation (nervous, not inflammatory), and there may be burning pains throughout the body and general prostration.

After a few hours, and especially if *Alcohol*, *Ether*, or *Ammonia* be freely administered, though apparently so grave, these symptoms may pass off almost as rapidly as they came on, leaving the patient comparatively well, simply weak, nervous, and tremulous for the next few days.

It would appear as though the venom, like fever poisons, acted as a ferment and set up a kind of catalytic action, which produces a retrograde metamorphosis in the blood and tissues which, if unchecked, would go on to the destruction of life; and which does always progress until, either by the inadequacy of the quantity of venom for the size of

the animal, or the superiority of the vital force, or the stimulus given by *Alcohol*, *Ether*, or *Ammonia*, the normal vital processes are re-established, and the venom neutralised or destroyed and its results removed, v. C 5, 10, 12, 13, 14, Ca 5.

Similar effects are produced by the other serpent venoms—lah.—vip.—elp.—naj.: and by the insect venoms—aps.—vsp.—cth.—thr.—trn—ara. Consult also especially aga.—ars.—bov.—cac.—cic.—cn-i.—dig.—gel.—hy-x.—ipc.—k-cy.—lau.—lob.—lcp.—rhs.—rn-b.—sec.—sep.—sol.—str.—tab.

2. *Severe Cases.*—In cases in which recovery or death takes place within a day or two, and before inflammation supervenes, the same constitutional effects are observed as in the "mild cases," but they are more pronounced, more violent, and more persistent. There may at first be a sudden cry, as of terror or pain, or a shudder or tremor of the whole frame, or an effort to vomit. The giddiness, fainting, and debility are extreme, producing staggering, falling, and inability to stand or sit up. The pulse becomes extremely feeble and irregular, and almost imperceptible. The respiration becomes difficult, slow, laboured, stertorous, and the chest much oppressed, inducing gasping for breath. The eyes become sunken, the expression becomes besotted, the face becomes swollen, and the whole body œdematous, jaundiced, cold, and the skin covered with cold perspiration, or intensely dry. The mind is very uneasy, restless, delirious, and there is sleeplessness, or the mental torpor becomes listlessness or coma. The voice becomes a whisper; swallowing almost impossible; thirst intense; vomiting incessant and bloody; stools diarrhœic, dysenteric, involuntary; urine albuminous, bloody, and urination involuntary. Blood issues from the eyes, nose, ears, mouth, gums, stomach, bowels, kidneys. Vesications form on the skin. The limbs tremble, are convulsed, or the whole frame may tremble or be convulsed, and the whole surface become sensitive or numb. The extremities may become cold and the patient may lie motionless, unconscious, speechless, and cold, as if dead.

All these grave symptoms may be present for some time, and yet the patient may recover; especially if blisters be applied topically, and *Alcohol*, *Ether*, or *Ammonia* be freely exhibited internally. In this happy event the warmth returns to the surface, the pulse returns to the wrist, sleep returns, the mind ceases to wander, the breathing becomes easy, the vomiting ceases, the countenance regains its natural appearance, the swellings disappear, the vesications dry up, and the skin resumes its natural colour and appearance; the hæmorrhages cease, the secretions return to their natural character, and the patient recovers his usual health within a few days, except that he remains weak and debilitated for some weeks and liable for some time to periodical returns of some of the effects, v. C 3, 12, 13, 14. Or, if this happy issue be not achieved, the patient sinks rapidly under the depressing influence of the poison, as though narcotised, or gasping for breath or convulsed. After death muscular irritability is rapidly lost, and putrefactive changes speedily set in [v. Mode of Death in Subacute Cases, p. 175; also C 2, 7, 15, 26, 28, 29, 33; Ca 5*a*, 7, 9].

Similar effects frequently follow sudden exposure to sewer gas, and

to air loaded with zymotic effluvia; also from large doses of arsenic largely diluted; and from the bites of other venomous serpents, and of venomous animals and insects such as apis.—cth.—vsp.—thr.—trn.—&c. Consult also aco.—aga.—bov.—cic.—dig.—gel.—hy-x.—k-cy.—lob.—mr-c.

3. *Prolonged Cases.*—In cases that are prolonged until reactive inflammation sets in, there are usually most of the effects exhibited by the "Severe cases;" and these are followed by the symptoms, first of inflammatory fever, and secondly, by those of putrid absorption, hectic fever, and exhaustion. The symptoms are principally those of phlegmonous erysipelas, diffuse cellular inflammation, gangrene, mortification, sloughing, or deep-seated septicæmic abscesses, carbuncles, boils, &c., and are too well known to require repetition in this place. They are fairly well exhibited in the later stages of **C** 22, 16, 24, 23, 33, 25, and **Ca** 5*a*; pp. 219—223; 238.

For analogous symptoms with other drugs, as well as the other serpent and the insect venoms, consult especially—arn—ars—fl-x—mer.—pho.—pi-x.—rhs.—sec.

II. *From* EXPERIMENTS.—The constitutional effects in "experiments" are the same in kind and possibly in degree as those from bites; they are more rapidly induced the more vascular the part experimented upon; and they are more severe the larger the quantity of venom used. They are the same whether the venom be fresh and pure, or diluted, or dried. *By experiments* the moderately severe, and the slight structural lesions, and the severe functional symptoms—mainly objective symptoms—are produced, v. **B** 4, 5, 6, 7, 9.

III. *From* PROVINGS.—By *provings* the slight structural, but mainly the functional, contingent, and mental symptoms—the subjective symptoms—are elicited, v. **A**, especially 1—7.

PERIODICITY.

Periodicity of some kind is less or more marked in the action of most drugs. Crotalus acts so powerfully on the nervous system that it is not surprising to find many of its effects exhibiting a kind of rhythmic recurrence. Some tend to occur especially in the morning, and some especially after sleep. "The intermittent character of several of the symptoms," says Dr. MANZINI, who inoculated a large number of persons with rattlesnake venom, is one of the most interesting and important of the points observed," v. pp. 206, l. 44, 234, l. 3. In some of the symptoms periodicity is well marked. In one case the yellow and dark spots that appeared on the skin after a bite disappeared in the winter, but recurred at the same time of the year following, accompanied by swelling of the hands and feet, s. 573. In another case there appeared "annually at the same time of the year pain, swelling and fever, with blue and yellow spots on the body," s. 574. In another a vesicular eruption, with contraction of the flexors of the hand, returned with perfect regularity every three months for over seven years, and afterwards irregularly for some years more, whilst gradually ceasing to recur, ss. 587, 588. In another, the person "experienced, all his life,

pains in the limbs, which always returned at the full moon." v. p. 183, l. 28, v. also s. 572.

The same tendency has been observed in the effects of lachesis and other venomous reptiles. "Dr. Leon Soubeyran," says Dr. Lilienthal, "records the singular case of a man who, having been bitten by a reptile six years ago, experienced annually for a month, from the date corresponding to that on which the wound was inflicted, some pains in the injured arm. Mr. George Villers has also noticed a periodically returning swelling in dogs, several years after they had been bitten by reptiles. Dr. Demarest relates the case of a woman, bitten at the age of twenty-six by a viper; she had, for a period of thirty-nine years, every spring on the 28th of May, an eruption of large vesicular bullæ on the forearm, attended with much itching, but no other disturbance of health." *North Amer. Hom. Journ.*, xvi, 500.

SIMILARLY-ACTING DRUGS.

The other drugs most intimately allied to Crotalus are, of course, the other serpent venoms—lah.—vip.—elp.—naj.—and the insect venoms—aps.—vip.—cth.—thr.—trn.—ara. Consult also, especially, aco.—aga.—ag-n.—ail.—ana.—arn.—ars.—aru.—bap.—ber.—bov.—cac.—cic.—cn-i.—con.—dig.—fl-x.—gel.—ham.—hy-x.—hyo.—ipc.—k-br.—k-cy.—k-hy.—lau.—lob.—lcp.—mer.—mr-c.—mez.—opi.—pho.—pi-x.—rhs.—rn-b.—sec.—sep.—sol.—str.—tab.—ver.

DURATION OF ACTION.

There are two principal actions of Crotalus, pathogenetic and curative.

I. The duration of the pathogenetic action of Crotalus, like that of other drugs, differs with the dose; with the specific susceptibility of the part acted on; with the kind and extent of the injury produced by it; and with the recuperative power of the part injured, and of the organism as a whole; that is, with the resisting power of the organism—the *vis medicatrix naturæ*, which is opposing the drug action. Let us consider it in Bites, Experiments and Provings.

1. *In* Bites.—It is really marvellous with what rapidity recovery can take place from some of the very extensive and very grave lesions of Crotalus poisoning; if possible, it is more remarkable than is the rapidity of their production (p. 173). In the case of a boy, "when seen within a few minutes after a bite, the gums were bleeding and the eyes were weeping blood. The blood appeared to be dissolved, so that it readily passed out of its proper vessels. . . . . He was perfectly restored within thirty hours," C 4. In the case of a young lady, "within two hours and a half after a bite, she was almost moribund; pulse wavy and scarcely perceptible; surface cold and bathed in

perspiration; face swollen, with a besotted expression; mind wandering; pupils dilated; with blindness and deafness. She was nearly well the next day," C 5, v. also s. 67, and C 6 and 7, and Ca 5.

But notwithstanding this very rapid recovery from some of the effects of Crotalus poisoning, symptoms sometimes prove very long-lasting; and even recur for years afterwards. In the case of a man, bitten on the heel, amaurosis existed on the second and third days; and there were slight pains and twitchings in the wounded part, and he could not place his foot on the ground firmly, a month afterwards. C 6, ll. 65—74. In the case of Dr. Shipman, bitten on the hand, "the skin of the hand and forearm desquamated several times; and it was three or four weeks before he felt himself again," C 8, l. 35. In the case of Mr. Briental, bitten on the hand, "he bled at the mouth and became feverish, and continued feverish and spitting blood for four days. The pain continued to rage in the arm and the fever to be violent; and by turns he was delirious for an hour or two; this happened three or four times. After nine days the fever abated and he began to mend; but his hand and arm were spotted like a snake, and continued so all summer. In the autumn his arm swelled, gathered and burst; and then all the morbid conditions passed away," C 16, ll. 26—34. In the case of Mr. B—, "after a few weeks all his hair fell off," C 3, l. 10. Dogs, too, sometimes lose their hair after some weeks, v. Ca 12. In the case of Mary O—, after a bite on the hand, the tendons remained contracted; and she had returns of vesicular and pustular eruptions every three months, for some years, C 25. In the case of a young woman, there appeared "annually, at the same time of the year, pains, swelling, and fever; with blue and yellow spots on the body," C 20. "The naturalist LESNEUR felt his sufferings for ten years after having been bitten by a Crotalus; and KOSTER reports the case of a negro who was bitten by a rattlesnake, and experienced all his life pains in the limbs, which always returned at the period of the full moon." NEIDHARD, p. 71, Bibl. III e.

2. *In* EXPERIMENTS.—Here, too, some symptoms are very transitory, and others are long lasting; though, as the doses have usually been sufficient to be fatal, few experiments have furnished opportunity to observe anything more than the early effects. In one case, however, muscular soreness of the thighs and itching tubercles in the skin lasted for five weeks, after an envenomed scratch on the wrist, v. B 1, ll. 85—95.

3. *In* PROVINGS.—In provings the symptoms have hitherto been mostly of a rather transitory character; they appear to be more lasting the later they come on in the proving, and the longer the proving is continued. Symptoms from one dose may come on immediately, and last a few minutes; or they may come on after a while, and last a few hours. After several doses they may last for days; and after prolonged proving they may last for weeks or months, v. A 3, 4, 7, 11.

II. DURATION OF THE Curative ACTION OF CROTALUS.—On the duration of the *curative* action of Crotalus, there is not yet much positive evidence. Nor, indeed, is it susceptible of very accurate determination; because it differs, of course, with the nature of the symptom or lesion for which the dose is exhibited, whether functional

or structural; whether acute or chronic; or whether the morbid action be at the time progressing, stationary, or retreating; and it will vary with the recuperative power of the part and of the organism as a whole.

In the case of a slight functional symptom, or where the morbid action is already retreating, one single dose may be sufficient to complete the cure; that is, may operate as long as there is any morbid action to rectify, or rather, one dose may start an action which brings about the cure, just as one little push may suffice to roll a stone from a house top; and especially if there is no great local or constitutional debility; for here the medicinal effort goes with the stream; it has the *vis medicatrix* assisting, not opposing it. But in a chronic structural morbid state, the action of each dose may soon come to an end; and the dose require to be repeated at certain intervals; just as many and repeated efforts are required to roll a dead-weight along a level road. Whilst, in an acute progressing structural malady, the action of each dose may be neutralised almost immediately by the rapidly spreading morbid action, which is going on like the spreading of the catalytic action in a fermenting liquid; just as each effort would be immediately neutralised by the opposition of gravitation in an attempt to roll a dead weight up the roof of a house.

Absorption of Crotalus Venom.—In this is involved the general question of the possibility of introducing serpent venom, of any kind, into the system by the mouth—through the mucous membrane of the digestive tube—either as a poison or as a medicine.

It is not a question as to absorption of serpent venom by serous membranes—pleura, pericardium, peritoneum, mesentery, arachnoid; or by the mucous membrane of the lungs, eyes, nose; for there is now no dispute on these points, even as to Crotalus; Dr. S. Weir Mitchell himself admitting that it can take place, and proof being abundant; v. *Thanatophidia* (Bibl. II t) exp. xvi, p. 108; applied to the conjunctiva cobra venom produced death: xx, p. 109; applied to the nose it produced local effects: vii, p. 111, to the conjunctiva = local and constitutional effects: xxiii, p. 115; conjunctiva = death; and many others. *Mitchell's Researches*, p. 77; exps. i and ii, applied to pulmonary mucous membrane, Crotalus produced drowsiness, convulsions and death; followed by extravasation and fluidity of blood. *New York Med. Jour.*, vi, p. 305 [Bibl. II g] applied to the pericardium produced death: p. 306, to the peritoneum = death: p. 308, peritoneum = local effects: p. 307; mesentery = local effects: p. 307, arachnoid = constitutional effects, v. also "Absorption of Serpent Venom," *Brit. Jour. Hom.*, xl, 45.

But whether or not serpent venom can, when pure or only slightly diluted, be taken into the blood through the unbroken mucous membrane of the digestive tube, not only has given rise to much controversy, but it is not yet accepted as settled to the satisfaction of all parties. It is therefore necessary to examine the matter in the present essay.

The serpent venoms that have been made the subjects of most of the experiments in this investigation are—that of the serpent of France and Germany, the viper; that of the serpent of America, the Crotalus;

and that of the serpent of India, the Naja: but as their structure, composition, and toxical effects are much alike, in these experiments they have been looked upon as one substance, and it has been assumed that what was proved to be true in this respect of one of them would be also true of all the rest, v. MITCHELL in *New York Med. Jour.*, vi, 295.

Now in each case the experimenters have differed as to the results: as to the venom of the viper, some, as Redi (1675), have denied the possibility, whilst others, as Fontana (1787), have supported the absorption belief; as to Crotalus venom, Dr. Mitchell has denied the possibility, whilst Professor Wilson has asserted it: and as to naja venom, Dr. Patrick Russell has denied it, whilst Drs. Fayrer, Richards, and Brunton have asserted and demonstrated it.

Now, what has been the cause of these contradictory opinions on a matter of fact susceptible of definite determination by experiment? It cannot have been incapacity in the experimenters, for more capable ones could scarcely have been found. Was it the different manner or experimentation? Or, has prejudice in favour of a previously accepted opinion had anything to do with it?

It is a *fact* that with all poisons a larger quantity is necessary when introduced by the mouth than when inserted by subcutaneous injection. A larger proportional quantity is required of mineral poisons; a still larger of the vegetal; and a yet larger of animal poisons; and a yet larger still of serpent venom. But it is merely a matter of quantity, not of quality of the poison. The first experiments were made with viper venom; the next with that of Crotalus; and the last with that of naja. Naja is the most virulent of the three; Crotalus the next; and viper the least virulent. It was therefore to be expected that demonstration of the possibility of absorption would be most easy with the venom of the naja; and next with that of Crotalus; and such has been the case. As to the manner of experimentation, Drs. Fayrer and Richards, in India, and Drs. Fayrer and Brunton, in England, placed the venom in the mouth; whereas Dr. Mitchell carried it directly into the stomach, without allowing it to come into contact with the mouth or œsophagus: he says, "the venom is innocuous if carried into the stomach. . . . . My own plan of giving the venom was to place it into the stomach by the aid of a glass tube, carefully rounded at the end" [*New York Med. Jour.*, vi, 294, 1868]. I do not find that in any of his experiments he tried absorption by the mouth or œsophagus; and yet, strangely enough, he says: "the venom of serpents fails to injure animals which swallow it." Drs. Fayrer and Brunton, on the other hand, appear not to have tried absorption by the stomach direct. Perhaps here is one cause of the discrepancy, viz. that serpent venom can be more readily absorbed through the mouth and œsophagus, than by the stomach. The former experimenter says it *cannot* be absorbed by the digestive mucous membrane, he having tried only the stomach; whilst the latter experimenters say it *can*, they having tried the mouth. Dr. Mitchell placed the venom of the Crotalus directly into the crop of several pigeons; into a knot of the small intestine of one rabbit; and into the rectum of three pigeons. He failed to observe local or constitutional effects when introduced into the crop of pigeons, whether

fasting or feeding, or from the introduction of it into the small intestine, until he pricked or scratched the lining membrane; but one of the pigeons into whose rectum he had introduced the venom, he says "passed a little bloody mucus and vomited: but after the lapse of a day was as well as usual, a result which somewhat surprised me. I do not think I wounded the part in this bird," *New York Med. Jour.*, vi, 296. Drs. Fayrer and Richards, in India, introduced the venom, fresh and pure, or diluted, into the mouth of several fowls, and one dog. In nearly all the cases local or constitutional effects, or both, were observed; in most of them to a very severe degree. Some of the fowls recovered; but most of them died. In one case of a fowl, *Thanatophidia*, p. 127, exp. xxv, there were severe constitutional effects, with convulsions; and death followed in 5 hours and 20 min.; in another, p. 115, xxii, severe constitutional symptoms occurred, including paralysis and convulsions; and death followed in 2 hours and 20 min.; in another, p. 137, xiii, severe constitutional symptoms occurred, including paralysis and convulsions; and death followed in 1 hour, 43 min.; in another, p. 127, xvi, severe constitutional symptoms occurred, with convulsions; and death followed within 1 hour; in another (the dog) p. 115, xxiv, severe constitutional symptoms, with convulsions; death following in 31 min.; and in another (fowl) p. 126, xii, death followed in 20 min. In some comments on his experiments with naja venom, Dr. Fayrer says:—p. 116, "The three last experiments quite settle the question of poisoning by absorption of the poison through the mucous surfaces. . . . . There can be no doubt of the absorption," and on p. 38, referring to the sucking of the wound, he says: "It must be borne in mind that there is danger in applying the poison to the lips, for it may be absorbed and evil results follow to the operator." [For similar testimony as to Crotalus, v. C16, l. 4, p. 219]. And on p. 4 he says: "It is capable of absorption through delicate membranes, and therefore it cannot safely be applied to any mucous surface. . . . . It kills when introduced into the stomach, when put into the eye, or applied to the peritoneum." Dr. Richards says, p. 126, "This experiment seems to show that not only does cobra poison, if administered internally in a sufficient dose, sometimes prove fatal; but very rapidly so." Drs. Fayrer and Brunton report: "Exp. xix, a small quantity of dried cobra poison, dissolved in water, was given to a young rabbit. It was readily swallowed. In seven minutes all the symptoms of poisoning were developed. The rabbit died in convulsions in 11 min., just as when the poison is injected hypodermically." "Exp. xvii, May 21st, 1873, 2.23 p.m. A small bit of dried cobra poison was put into a frog's mouth, and swallowed. . . . . 4.5 p.m., appears to be paralysed in the fore legs; 4.25 p.m., hind legs becoming weaker. Complete paralysis and death in two hours and a quarter." And they remark: "Whatever may be the effect of the venom of the viper or Crotalus, the cobra virus produces its poisonous effects tolerably rapidly when swallowed; both in the frog and in warm-blooded animals." *Proc. Roy. Soc.*, xxii, pp. 82-3, 1874; v. also for another similar experiment with a frog, *Proc. Roy. Soc.*, xxiii, p. 275, exp. xviii. And Sir Joseph Fayrer goes still further when speaking on the subject before

the Medical Society of London, for he there says: "the poison kills if passed into a rabbit's stomach, or into a bird's gizzard." *Lancet*, April 28th, 1883, p. 729.

For a case of death from absorption of cobra venom in its mother's milk by a suckling infant, v. *Thanatophidia*, p. 43. And as to rattlesnake venom, Professor Wilson says: "This opinion, however, that the poison of snakes may be taken internally without producing any troublesome effects has been recently contradicted by the experience of Dr. Hering, at Surinam. This traveller took at different times various doses of the poison of a rattlesnake (Crotalus mutus) mixed with water, and suffered from its effects for upwards of eight succeeding days. These manifested themselves by pains in the larynx and other parts of the body, by an increased secretion of mucus in the membrane of the nose and œsophagus, and by frequent diarrhœa, accompanied by pains in the rectum. To these symptoms were added several others of a rather curious kind attributable to the influence which the poison seemed to exercise even over the moral faculties." *Encyclopædia Britannica*, 7th edit., 1842, vol. xx, p. 127, *Art.* SERPENTS; by JAMES WILSON, F.R.S. Ed.; v. also "Provings," especially A 6 *b*, 10, 11, 12—16, pp. 198, 200, 201.

Absorption as a Poison.—There can, then, be no room for further doubt that serpent venoms, and Crotalus amongst the rest, can be taken into the blood through the unbroken mucous membrane of the digestive tube, at least of the mouth, and perhaps œsophagus; in sufficient quantity to produce its ordinary poisonous effects. This is placed beyond dispute as to cobra venom, and therefore, inferentially, as to Crotalus, for what is true, in this respect, of cobra venom is more than probably true of Crotalus: indeed, Dr. MITCHELL himself writes: "I had little doubt that what was true of one snake poison would be true of all the rest." And he goes on: "Perhaps I should also add, that in two of Prof. Mangili's [a strong opponent of the absorption belief—J. W. H.] experiments, the animals which had ingested the venom (of the viper) seemed to him to become for a time weak and sluggish. Larks, thus treated, he describes as falling, for a time, into a condition of stupor and inertia." *New York Med. Jour.*, vi, 295. Besides, the unbroken mucous membrane of the digestive tube offers no effectual barrier to the introduction of other animal poisons, such as typhoid poison, sepsin, cantharis, moschus, coccus, oleum aselli, ergot, &c., which are capable of producing poisonous effects. These, as well as Crotalus, are probably somewhat neutralised and their power diminished when acted on by the gastric juice. What poison is not? That the venom of insects can nevertheless enter the system through the gastric mucous membrane is evident from the poisonous effects of preparations of cantharis when swallowed.

Absorption as a Medicine.—In the light, then, of recent investigations, the idea that serpent venom will not act as a medicine, if exhibited by the mouth, must be abandoned; and must not be allowed to interfere with the fullest confidence in Crotalus as a medicine, when exhibited in the ordinary way. Besides, the unbroken mucous membrane of the digestive tube offers no effectual barrier against the introduction of the

other animal substances used as medicines—cantharis, apis, tarantula, theridion, aranea, coccus, moschus, castoreum, secale, oleum aselli, &c., when exhibited by the mouth; so neither does it to Crotalus. These other animal substances, as well as Crotalus, are probably somewhat neutralised and their power diminished when acted on by the gastric juice. What medicine is not? But are they necessarily submitted to the action of the gastric juice when used as medicines in the ordinary scientific preparations and doses? This is very questionable. Do these doses not altogether escape any such action? The particles or atoms contained in a dose of 6th, 3rd, or 1st, or even 1^{x}, in all probability impress the nerves or pass into the blood through the mucous membrane of the mouth and œsophagus without being at all acted on even by the saliva, or modified by the action of the cells of the mucous membrane; very little of it may ever reach the stomach at all; and what does, is probably so subtle as to escape the action of the gastric juice and gastric cells.

The remarks on this subject by Dr. HEMPEL are evidence of how one-sidedly a subject may be treated on defective information; and how the practical evidence of facts can be ignored under the influence of theoretical preconceptions, v. Lecture lxxxi, *Lachesis*. First edit.

DOSE OF CROTALUS VENOM.—The *dose* may be studied with reference to—1, toxicology; 2, pathogenesy; 3, therapeutics.

I. THE TOXIC DOSE.—To produce the serious structural lesions that follow Crotalus poisoning, the quantity of fresh venom required to be subcutaneously injected varies (1) with the season of the year, (2) with the size of the animal experimented upon, and (3) with the degree of concentration of the venom.

Warm-blooded animals are extremely sensitive to the action of Crotalus venom; cold-blooded creatures, too, readily succumb to its deadly influence, and they exhibit the characteristic effects from very small quantities.

Of all warm-blooded creatures birds are the most sensitive to the influence of this poison; half a drop will kill a canary within a minute or two, one eighth of a drop will prove fatal to it after the lapse of from two to eight hours, so that it is probable that even a smaller quantity would suffice to destroy its existence. A quantity not quite so small as this, about one third of a drop, is required to kill a pigeon; a larger quantity, about a drop, is required to kill a rabbit; and a still larger quantity, about two drops, is required to kill a dog. Six drops may be considered a certainly fatal dose for an adult human being, when injected into a vascular part. The larger the animal the larger the quantity required, as might reasonably be expected, for the larger the animal the greater its resisting power and the greater the dilution of the venom when dispersed throughout its body. Also the more vascular the part into which the venom is introduced the more rapid and energetic is the action. It acts with extreme rapidity and energy when introduced directly into a vein; it acts only slowly when introduced into a merely adipose tissue; the hog, for instance, is scarcely affected when the venom is introduced into its fatty side, but when introduced into a vascular part the effects are as certain as in other animals.

Observation shows also that the virulence of the venom is greater in the breeding season, and in hot weather; and, as the venom becomes darker in colour and more viscid in consistence by being long retained in the gland and duct, it may be supposed to be thereby increased in virulence.

By fatal doses certain serious characteristic functional derangements and structural lesions are produced, but, as these are fully detailed under the heads of "Topical Effects," and "General Effects" (pp. 177-9), it is not necessary to give them here.

II. The Pathogenetic Dose.—For the gradual and orderly production of the signs and symptoms of Crotalus poisoning the quantity of venom necessary, when injected underneath the skin, varies with the conditions mentioned under the head of "Toxic Dose," and with the particular class of effects—absolute or contingent—desired to be elicited, and with the presence or absence of specific susceptibility.

[For a description of the absolute and contingent effects of drugs v. "Dose of Crotalus Venom," by the present writer, *Brit. Jour. Hom.*, xl, 113, partly taken from "Drysdale on the Use of Specifics," *Brit. Jour. Hom.*, xxvi.]

The pathogenetic dose may be studied under three degrees of power, viz.: (1) the dose that will produce the characteristic pathological lesions; (2) the dose that will produce the absolute effects; and (3) the dose that will elicit the contingent symptoms.

1. *First division of the Pathogenetic Dose.*—A quantity just within the limit of the fatal dose is required for the rapid production of the serious morbid effects and characteristic pathological lesions, such as: staggering, vomiting, prostration, convulsions, rapid and feeble action of the heart, embarrassed respiration, syncope, cold sweat, tremor of the limbs, discoloration of the skin, intoxication, stupor, coma; local pain, swelling, hæmorrhage, extravasation, decomposition; systemic ecchymoses, hæmorrhages, hæmaturia, diarrhœa, dysentery, abscess, mortification, sloughing, &c. This quantity would, in all probability, be the twenty-fourth of a drop in the case of a canary, a twelfth of a drop in the case of a pigeon, one sixth of a drop in the case of a rabbit, and half a drop in the case of a dog, perhaps one eighth of a drop would be sufficient in the case of a child, one third drop in the case of a youth, and one drop in the case of an adult human being, introduced either in its natural state or in dilution in water or glycerine, and in one dose or in divided quantities repeated at short intervals.

2. *Second division of the Pathogenetic Dose.*—For the production of the severe functional derangements and the slight structural lesions—the absolute effects or symptoms—such as: vertigo, fainting, oppression of the heart and respiration, anxiety, depression of spirits, nausea, softened and bleeding mucous membrane of the mouth, nose, eyes, kidneys (hæmaturia), rectum (dysentery), inflammation of the fauces, weakness, tremulousness, rigors, coldness of the surface, sensation of constriction about the throat, &c., the dose required would probably be from about one sixteenth to one eighth of a drop in the case of a youth, and from one eighth to one third of a drop in the case of an adult human being; and either in dilution in water or glycerine, or in the

ordinary pharmacopœial preparations, namely, the first decimal or centesimal dilution, and either in one dose or in divided quantities repeated at short intervals. And it may perhaps in these cases be exhibited by the mouth; but then larger quantities would be required; this, however, is not peculiar to Crotalus venom, for it is so with all other drugs.

3. *Third division of the Pathogenetic Dose.*—For eliciting the contingent symptoms, and for producing the slight functional effects, such as: slight vertigo, tickling, irritation, dryness, stickiness in the fauces and larynx, cough, sensation of constriction in the throat, swollen feeling in the fauces, congestive appearance of the fauces, feeling of oppression and uneasiness about the heart, fluttering about the heart, anxious and oppressed respiration, sensation of want of breath, anxiety, depression of spirits, tremulousness, rigors, sensibility of the surface, blushes of redness of the skin, frequent urination, irritation of the urinary passages, uncomfortableness or tenesmus of the rectum, sensation of burning or dryness of the eyes, nose, &c., and so on; the quantity required would be much less, namely a few drops of the first or second or third centesimal dilution, or indeed, in persons in whom exists a high degree of the special susceptibility to the influence of the venom, dilutions higher up in the scale, as will be seen by many of the symptoms recorded in Allen's *Encyclopædia*. In fact, the eliciting of the contingent symptoms bears no relation to the quantity of the drug introduced, but depends upon the presence of the special susceptibility; —not so much upon the dose as upon the individual. There is no quantitative relationship, for instance, between a fractional quantity of the pure venom mixed with cheese and "a pressing pain in the eyeball on moving the eye, as if the orbits were dry inside," recorded by Schmöle, S. 133; or between a very infinitesimal quantity of the venom and "severe vertigo; severe congestive headache; scanty urine, sp. g. 1031, red axillary perspiration; tenderness of the heart; and severe muscular pain in the thighs," recorded by J. W. H., **B** 1, p. 203; or between a still more infinitesimal quantity and "severe mental stupidity and forgetfulness, with severe neuralgic pains in abdomen and temple," recorded by E. D., **B** 2, p. 204; or between ten drops of the first centesimal attenuation and "a continued tearing pain in the front part of the brain, with tenderness of the brain felt on coughing or sneezing, and a confused muddled feeling;" recorded by J. W. H., **A** 2, p. 196; or between a few drops of the third cent. and "soreness of the pericardium, followed by sensation of painful stiffness and elongation of the uvula, and mucus in the fauces; pulsative headache, and severe catarrhal symptoms," recorded by J. W. H., **A** 3, p. 196; or between a few drops of the first decimal atten. and "distorted vision," recorded by J. W. H., "**A** 4," p. 197; or between a few drops of the third cent. and "much palpitation and trembling of the heart, and feeling as if the heart tumbled about; with itching of the palms and flushing of heat throughout the whole body," recorded by E. J. H., **A** 5, p. 197; or between four drops of the third atten. and "dryness of the throat with thirst, pain in the bowels, and premature and free catamenia in a person who had them scanty with a tendency to retardation," recorded by S. E. S., **A** 7, p. 199.

But contingent symptoms can be elicited by any and every dose, whether infinitesimal or massive, and may be discovered not only amongst the details of provings, but amongst those of experiments and bites.

III. Therapeutic or Medicinal Dose.—The most appropriate medicinal dose varies with certain conditions, objects, and requirements, ranging from somewhat less than the pathogenetic dose, as the lowest, up to the limit of the divisibility of the venom as an organic compound, as the highest dose.

The *most* material medicinal dose must certainly be less than the pathogenetic dose, but how much less only experience can determine; and in this Crotalus venom does not differ from other medicines, so that experience with other medicines may be taken advantage of to assist in determining the lowest or most material dose of Crotalus venom.

The *least* material dose should certainly be sought for in attenuations short of that in which the number of particles of the venom are either at immense distances from each other in the menstruum, or are absolutely broken up and destroyed by the attenuating process; for, unlike the mineral and metallic medicines, which are composed of simple elementary matter, any atom of which would be a true representative of the whole, pure Crotalus venom is a complex organic compound, composed, in its natural state, of several other organic compounds, such as albumen, colouring matter, fatty matter, salts, crotaline, &c. Theory, science, and philosophy as well as experience, must, therefore, be consulted in determining the dose of Crotalus venom; at all events in determining the *least* material dose.

As an organic compound, Crotalus venom cannot be infinitely divisible; ultimately it must consist of organic particles, division or breaking up of which would destroy its identity.

There is, therefore, a degree of attenuation beyond which it is not wise to carry Crotalus venom. After having arrived at the ultimate particles of the venom, any further attempt at attenuation, if it does not break up the particles and destroy them altogether, only separates them farther and farther from each other in the menstruum, perhaps to the extent of one particle of venom to a thousand or a million particles of the menstruum; thus making it a thousand or a million chances to one against any particular dose containing any Crotalus at all.

Now, all scientists admit a limit to the divisibility of matter, and maintain that all matter consists of atoms which are no further divisible; and all scientific investigation appears to limit the divisibility of *simple* matter at from about the 12th to the 18th attenuation of the centesimal scale; and of all *organic* matter at from about the 9th to the 12th. It would, therefore, be unsafe, to say the least, to carry the attenuation of Crotalus venom beyond the 12th centesimal; and it would be unwise to carry it beyond the 9th. Indeed, as Crotalus venom is made up of several organic compounds associated together, it would be wiser not to go even thus far; for, although perhaps the Crotaline would not be broken up at the 12th, still it is desirable not to run any risk of breaking up the complete venom, inasmuch as the symptoms we have

to guide us in its use are not results of Crotaline, but of the venom itself in its entirety; and we should always endeavour to use the same drug to cure as produced the symptoms. On the whole, therefore, it would perhaps be sufficient, and answer every purpose in practice, if the limit of the attenuation of Crotalus venom were fixed at the 9th, or even the 6th centesimal. The 6th centesimal would perhaps be low enough to avoid breaking up the venom, and high enough to meet even the requirements of the contingent symptoms, which, as shown under the pathogenetic dose, are outside the region of quantitative relationship between dose and effect. The 6th centesimal, or, at any rate, the 5th or the 4th, would also probably be quite low enough to meet the semi-contingent and other symptoms classed under the third division of the pathogenetic dose, and for the diseases pointed to by such symptoms.

In the region of the contingent symptoms there is no proportional ratio between quantity and power in therapeutics any more than there is in pathogenesy; all depends upon special susceptibility. There is no quantitative relationship, for instance, between a few drops of the 6th attenuation of Crotalus and the cure of congestion of the fauces, or irritation of the larynx, cough, cardiac and respiratory oppression, anxiety and oppression, bleeding gums, hæmaturia, dysentery, scurvy, purpura hæmorrhagica, or many other serious diseases recorded in our literature as cured by the 6th and higher dilutions. And not only is there, in the region of the contingent symptoms, no necessity to descend to the grossly material doses, but there is even no real necessity to ascend to the possibly immaterial doses; any reasonable dose will cure, just as any dose will produce them, for here reigns the *omni dosi* liberty of Dr. Imbert Gourbeyre; and it is only necessary to avoid using, on the one hand, doses low enough to induce physiological effects, and to keep to those where "the whole physiological action is absorbed in the therapeutical," as insisted on by Dr. Drysdale; and, on the other hand, to refrain from using *preparations* in which there is any risk of the identity of the medicine being destroyed, or *doses* in which there may be no medicine at all.

Such is the state of matters in the region of the contingent symptoms, and, to a certain degree, in the region of the semi-contingent effects and structural changes such as those classed under the third division of the pathogenetic dose.

It is different in the region of absolute symptoms and direct structural lesions. Here there may exist some quantitative relationship between the size of the dose and the effect, in therapeutics as there is in pathogenesy. Here—in the region of the absolute symptoms—the curative dose may have to bear some proportionate ratio to the pathogenetic dose, and it is probable that the more absolute and structural the symptoms the more material will the dose require to be. With such functional derangements and structural lesions, for instance, as those classed under the second division of the pathogenetic dose, such, for example, as vertigo, fainting, oppression of the heart and respiration, anxiety, depression of spirits, nausea, softened and bleeding mucous membrane of the mouth

nose, eyes, kidneys, and rectum, inflammation of the fauces and of the larynx, weakness, tremulousness, rigors, coldness of the surface, &c.—and which would be produced by doses of one sixteenth to one third of a drop of the venom—and the diseases pointed to by such symptoms, would be best treated with about the third centesimal attenuation. And that such morbid effects and structural lesions as those classed under the first division of the pathogenetic dose, such, for example, as staggering, vomiting, prostration, convulsions, rapid and feeble action of the heart, embarrassed respiration, syncope, cold sweat, tremor of the limbs, discoloration of the skin, intoxication, stupor, coma ; local pain, swelling, hæmorrhage, extravasation ; systemic ecchymoses and hæmorrhages, hæmaturia, diarrhœa, dysentery, abscess, mortification, sloughing, &c.—and which would be produced by from one third of a drop to one drop of the venom—and the diseases pointed to by such symptoms, such as malignant smallpox, measles, scarlet fever, diphtheria, typhus fever, yellow and puerperal fevers, malignant pustule, diffuse inflammation of the connective tissue, septicæmia, dissection wounds, and other results of purulent infection—erysipelas, carbuncle, whitlow, &c., would be best treated with the first attenuation. Here, in fact, comes in the rule of "the curative dose being just within the limit of the pathogenetic dose."

Under this rule, however, great care must be exercised that the dose does not overstep the boundary where "the whole physiological action is absorbed into the therapeutical;" there must be no surplus power to produce disease elsewhere. This is especially necessary when prescribing for such conditions as the structural lesions classed under the first divisions of the pathogenetic dose, when great care must be taken not to prescribe such doses as would produce the effects classed under the second or even the third division. There is also the difficulty of distinguishing the symptoms of the different classes, for there is, as Dr. Drysdale says, no sharply dividing line between them.

But is it necessary thus to sail under the wind so near to the rocky leeward shore? I do not believe it is. I do not deny that sometimes very rapid and brilliant results may thus be obtained—brilliant results occasionally follow any and every kind of bold practice, but in homœopathy risky practice is quite unnecessary ; everything reasonable can be accomplished outside the region of pathogenetic risk. I believe that the sixth centesimal can accomplish all that Crotalus can do in the region of the contingent and semi-contingent symptoms, and the diseases pointed to by such symptoms ; and that this same dilution, or the fifth, or the fourth, or at any rate the third, can accomplish all that Crotalus can do with the symptoms classed under the second division, and the diseases pointed to by them ; and that even with the symptoms classed under the first division and the diseases pointed to by them, it will very seldom be necessary to descend below the third centesimal attenuation. In some rare cases it may, indeed, be advisable to try the first, or even the first decimal, v. p. 194.

This question has been more fully considered in an article by the present writer in the *Brit. Jour. Hom.*, xl, 113, 1882, IIIo.

MODE OF ADMINISTRATION OF CROTALUS (AS A MEDICINE).

The best way to administer Crotalus, under ordinary circumstances, is by the mouth, in solution in water; about half a drop of the attenuation in a tea-,dessert-, or tablespoonful of water.

In *acute diseases* the dose may be repeated every two hours, or one hour, or even half, or three hours. After considerable experience with all the attenuations from 1—12, the writer now relies mainly on the attenuations 3—6. The range of attenuation should certainly be limited by the 1st and 12th, v. p. 191.

In those rare and extraordinary and rapidly fatal diseases—hæmorrhagic or putrid small-pox, measles, scarlet-fever, typhus, yellow-fever, &c. [v. p. 193] in which crotalus is the main resource, it may perhaps be advisable to administer even the first attenuation; and in some of them to introduce it directly into the blood by subcutaneous injection, in such cases, for instance, as malignant scarlet-fever, diphtheria, &c., where the mouth is foul or the fauces are occupied by sloughs; or in the early stage of those of local origin, such as malignant pustule, carbuncle, whitlow, dissection wounds, &c., where it could be introduced into the primary seat of the disease.

In such cases, five minims of the first attenuation might be injected every few hours, for a few doses, with perfect safety, and perhaps with considerable prospect of success in, otherwise, apparently hopeless cases. Or a small portion of a drop of the first decimal might be rubbed into scarifications made in the skin, v. **B**, 1, 2. This mode of introduction may also be made use of in most skin diseases.

In *chronic diseases* Crotalus may be administered in tincture, two or three drops in a spoonful of water night and morning, or a pilule two or three times a day.

EXTERNALLY it may be applied to ulceration, gangrene, phagedæna, &c., in the form of lotion, or on wet compress. It may also be used in the form of spray, to gangrenous or sloughing fauces, nares, &c.; in malignant scarlet fever for instance.

CROTALINE may be used in trituration; the third decimal and upwards.

PATHOGENETIC MATERIAL.

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A. PROVINGS.

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1. CONSTANTINE HERING, M.D.—A healthy veteran prover; one of the best authorities on symptoms. In his *Wirkungen des Schlangengiftes*, a few symptoms have only the initials C. H.—WIRKUNGEN.

SCHMÖLE.—One of Dr. C. Hering's provers. Dr. Hering calls him: "A very active, energetic young man, a diligent prover." He appears to have taken several doses of first or second trituration; and to have furnished two symptoms of Mind, two of Sensorium, three of Head, three of Eyes, five of Ears, six of Face, five of Mouth, three of Fauces, six of Œsophagus, four of Abdomen, one of Stools, one of Urinary Organs, twelve of Respiratory Organs, one of Back, thirty-eight of Extremities, three of Sleep, and one of Generalities.—WIRKUNGEN.

LINGEN.—One of Dr. Hering's provers. He appears to have taken several doses of first or second trituration; and to have furnished three symptoms of Mind, one of Sensorium, one of Eyes, one of Nose, one of Face, two of Mouth, one of Abdomen, one of Stools, two of Urinary Organs, one of Respiratory Organs, one of Back, three of Extremities, and two of Generalities.—WIRKUNGEN.

KUMMER.—One of Dr. Hering's provers. He appears not to have taken many doses, as he furnishes only two symptoms of Sensorium, two of Head, and two of Breasts.—WIRKUNGEN.

2. JOHN W. HAYWARD, M.D., æt. 43. Nervo-lymphatic, bilious temperament; dark hair and eyes; good health, but has had bronchitis and quinsy. Lives by rule; never uses tobacco in any form, and seldom alcohol. His habit in "proving" is to try to forget having taken the drug and not to note any symptom unless it distinctly arrests his attention whilst otherwise occupied.

First Proving.—July 24th, 1872. Took, in water, ten drops of

first cent. atten., at 10.40 a.m.; at 10.50 my attention was arrested by a sharp downwards-drawing pain on right side of nose, near inner canthus. This lasted about a minute, and then gradually changed into a dull-bruised pain; which lasted for ten minutes, and then passed off gradually. There was, at the same time, a slight quivering feeling in lower lip, near left corner of mouth: lasting half a minute. At 11.0 there was a continued tearing pain in brain, just above root of nose; with a confused muddled feeling; on coughing front part of brain felt a jerk, as if it were tender. After this I went out of doors and was too occupied to notice symptoms. Returned at 1.15 and took another ten drops; at 1.30 felt quivering in left under eyelid, for a few minutes. I now lunched, and did not observe any symptom until, when sitting quiet after lunch, there was return of the pain and sensitiveness of the front part of the brain, aggravated by coughing and sneezing. Being called out the proving was interrupted, and was not resumed.—*Brit. Jour. Hom.*, xli, 26, 1883.

3. *Second Proving.*—September 17th, 1881. Took five drops of third cent. atten., in water, at 10 a.m. Did not notice any effect. At 11, took another five drops, and went out of doors; after about quarter of an hour my attention was drawn to my heart by a feeling of soreness, as if in the pericardium; this lasted a few minutes. After another quarter hour attention was arrested by a feeling of soreness along cartilages of ribs in epigastrium; this lasted a few minutes. At 1 p.m. took another five drops; did not notice any effect. At 3, took another five drops and went out: nothing peculiar arrested my attention until evening, when I noticed myself yawning constantly; and then my attention was drawn to the fauces by a feeling as if the velum were stiff and too long, and as if fauces were lined with mucus. At 11 p.m. took another five drops and went to write: went to bed at 11.45. Slept heavily and dreamed much, and on awaking in the morning felt as if the brain were contracted and lay loose within the skull, and fell about on moving head; and as if it were tender or morbidly sensitive, so that a pulsative headache was felt synchronous with the pulse, as if the brain were somewhat grasped: also a tenderness of the heart on turning to lie on left side, as if pericardium were morbidly sensitive; these two symptoms continued for half an hour; and went off whilst dressing. Sept. 18th. Breakfasted at 9 a.m; at 10 took ten drops; at 10.10 felt a pressing pain behind left orbit, slightly pulsative. 11, took another ten drops and went out; at 11.30, whilst driving, attention was arrested by sensation of swelling of velum with feeling of mucus in fauces, which had to be swallowed down or hawked up, or as if uvula were hanging too low. 12.30, constant yawning, also a downwards-pulling pain in a small spot in head in right side of vertex; and still the feeling of mucus in fauces, with some sore pain about uvula on swallowing; followed shortly by a singing in whole head as after taking chloroform, continuing for some time, and being followed by a full congested feel of whole front part of brain, with torpidity of intellectual faculties, or dull confusion in front of brain. 1.30, took another ten drops; same symptoms continued. 4 p.m., took another ten drops; same symptoms continued; they only

disappeared during the evening. Sept. 19th. On awaking this morning had much itching of skin all over. 10, took twenty drops; attention not arrested by any symptoms. 11, took another twenty drops, and went out; all forenoon much yawning and sneezing, and much increase of secretion of watery mucus from nose. 2 p.m., took another twenty drops, was very busily occupied, and attention was not drawn by any symptom. 3.30, took another twenty drops, and went out: all afternoon much yawning and sneezing, and catarrhal running from nose, with some stinging about nostrils. 5, took another twenty drops: sneezing, stinging and catarrh continued all evening. Went to bed about twelve; about 2 a.m. was waked up by painful neuralgic drawing in fauces, worse on left side about root of tongue, almost producing choking, and not relieved by anything I did; it lasted over quarter of an hour, and then disappeared. After three hours more, was waked up again with severe drawing pain in right wrist, not relieved by rubbing; it lasted ten minutes. Sept. 20th. From unfavorable interruption took no more of the drug; felt, however, out of sorts all day, and weak at the heart, and more easily tired and out of breath than usual, especially on going up hill; and only regained my usual good health gradually after some days.—*Brit. Jour. Hom.*, xli, 27, 1883.

4. *Third Proving.*—June 19th, 1882. Took five drops first decimal, in water, at 8.45 a.m.: whilst at breakfast, 9.5, attention was arrested by a severe clawing pain in left side of cerebellum, lasting a few minutes; at 9.40, whilst reading, attention was arrested by a pricking, and a sensation of constriction at fauces; at 10, attention was arrested by a grasping pain at under surface of left frontal lobe of brain over back part of orbital plate, for about a minute; followed by a dull, heavy, congested feel of whole front of brain, lasting several minutes; this recurred on intellectual exertion shortly afterwards. Was occupied too much during the day to notice symptoms, but during afternoon and evening attention was constantly being drawn to the fact of dimness of vision, especially for distant objects; could scarcely recognise the face of friends across the street. During the night had to rise twice to urinate, urine copious and light coloured. June 20th, 7.40. Took five drops: shortly afterwards return of the grasping headache at under surface of left frontal lobe; and during the forenoon sneezing and nasal catarrh; with dimness of sight during reading, and as if the letters had a reflection beneath making them appear double, one line half underneath the other. Afterwards too much occupied to observe symptoms; and proving interrupted.—*Brit. Jour. Hom.*, xli, 28, 1883.

5. E. J. H. married lady, æt. 40, nervo-lymphatic, black hair and eyes: has had bronchitis and quinsy; now in good ordinary health.

Sept. 20th, 1872. Took three drops of 3rd cent. dilution, every two hours, for twenty-four hours, not knowing what she was taking. Shortly after beginning, and for the whole day, she complained of much palpitation and trembling of the heart and feeling as if heart tumbled about, with heat and itching of palms, and flushing of heat throughout whole body. During the night had a sudden attack of sorethroat as if swelling of uvula and velum, with dryness of whole mouth; and next morning the tumbling of heart was worse; and she objected to take

any more of the drug. The weak trembling condition of heart continued for some days.—*Brit. Jour. Hom.*, xli, 29, 1883.

6. M. J—, a married lady, æt. 50, nervous temperament, light hair, grey eyes; delicate, but in usual health.

March 28th, 1874, took three drops of 3rd cent. dil. four times a day; and continued same dose for two weeks, under a pretext as a tonic, though not complaining. During the time she frequently complained of a feeling of exhaustion at the heart, and sensation as of jumping out or tumbling over, with a general weak feeling. She afterwards felt better than usual in her general health.—*Brit. Jour. Hom.*, xli, 29, 1883.

6 *a*. Mrs. T—, æt. about 28, light hair and eyes, of somewhat strumous constitution, had been suffering for some time with a dry cough, worst at night. It was caused by a tickling in the larynx and fauces, especially about left side of root of tongue. Crotalus 3 was ordered, two drops every two hours. This relieved the cough the first day, but it caused her to have horrible dreams; sometimes it was herself that was in difficulties and dangers, at others it was members of her family, and once it was her baby being murdered before her eyes. This was quite a surprise to her, as she was not at all subject to dreaming. It was the first time she had taken Crotalus. Her cough being cured within a week the Crotalus was left off; the dreaming then ceased, and she has not been troubled with either the cough or dreaming since.—HAYWARD, 1883 (MS.)

6 *b*. Mrs. B—. Dr. Gelston having some Crotalus 1ˣ, he designed a proving on an intelligent and observant lady, Mrs. B—, aged 29, who had a slight chronic hawking. Without letting her know the design or the drug, he ordered her three drops in water four times a day; and requested her to take it for a month; this she did, notwithstanding the morbid effects produced: he calling occasionally and encouraging her to persevere.

After taking the drug for about a week she noticed herself becoming dreadfully irritable and cross, so that the least annoyance would send her into a fury, which was very contrary to her natural disposition: and she was very sensitive to noises, particularly such as the crumpling up of paper; the slamming of a door quite alarmed her. She also noticed the appearance of dark red spots under the nails of fingers and toes, and in the skin of different parts of the body, especially the legs; under the mucous membrane of the mouth; and in the conjunctiva—the eyes became bloodshot. On blowing the nose or coughing there would be blood on the handkerchief, and on wiping the ears after washing, there would be blood on the towel. The spots under the nails appeared as if blood would issue out at the finger ends. The stools also were bloody; and the urine of a dark smoky colour.

These symptoms increased gradually during the taking of the drug, and only disappeared gradually during the three weeks after leaving it off.—JAMES P. GELSTON, Surgeon.

7. S. E. S—, a lady of bilious, sanguine temperament, unmarried, 35 years of age, subject to indigestion.

Jan. 22nd, 1852.—Took a drop of the 3rd attenuation morning,

midday and evening. Fulness and pressure in the stomach were relieved by the medicine. Appetite bad all day.

23rd.—No medicine. Appetite bad.

24th.—Weight on stomach and chest; breakfast lies heavy all day; standing up fatigues her much; tremulous weakness all over as if some evil were apprehended; flatulence and eructation. To day took a dose of four drops, 3rd dilution.

25th.—Stomach sore and tender on rising this morning, tongue *red and sore; gums white; throat dry, with thirst.*

26th.—The above symptoms continue, but in a milder degree. They gradually ceased after the medicine was left off, and she got quite well.

31st.—Took a pilule soaked in the 4th dilution in the evening. In the night she was awakened by a violent burning pain in the hypogaster, going through to the sacrum; burning pain in epigastrium for half an hour, when it ceased after a stool.

Feb. 1st.—Stomach sore and tender; worse after food; urine scanty and red. After this felt very well for four days.

5th.—The soreness returned in the epigastrium, extending upwards under sternum. Pains in stomach after breakfast and dinner.

8th.—Headache, and cold feet. The headache is in the vertex; pressive; comes on in the afternoon, and lasts till night for three days. On the fourth day it changed to forenoon, with heat and flushing of face. An attack of diarrhœa now came on; after which the bowels were costive and evacuations hard, during a week. Anxious dreams; is drowsy and heavy in the evening; turns about very much in bed; is easily tired by slight exertion; the arms feel benumbed in the morning; the legs *go to sleep* and tingle when sitting, lips and throat dry, without thirst.

25th.—Catamenia a week too soon; free; preceded by weight in the head and ears; accompanied by pains in the abdomen and back, and cold feet. The period *lasts some hours longer than is usual*, and goes off on the 27th, with an intense frontal headache, which lasts from ten to one o'clock in the night. She had this night a cramp in the calf of one leg. In the evening a sudden attack of sorethroat and bronchial catarrh, which went away on the morning of the 28th and returned at night. During several days there was soreness of chest and cough in the evening.

Remarks.—The throat dryness, the catarrhal symptoms, the pain in the bowels, the premature and free catamenia in a person who had them scanty, and with a tendency to retardation, seemed to me to depend clearly on the action of the medicine. These were symptoms very unusual with the prover, who appears to have been very susceptible to the action of *Crotalus.*—*Brit. Jour. Hom.*, xli, 30, 1883.

8. J. V. Martin.—*First proving.*—Took one dose. [It was Mure's rule to exhibit only one dose, v. p. 66, l. 25] of first or second trituration [v. p. 23, l. 11—16] of venom of *Crotalus horridus.* There followed, during the first day, heavy pain in back of orbit and at left eyebrow. Second day, pain under right orbit, and at right side of forehead. Third day, dry cough with tickling in throat at night.

9. *Second proving.*—Took a dose of first or second tritur. at 10 p.m. There followed, on first day, pricking all over body; starting during sleep: sleeplessness. *Mure's Materia Medica*, pp. 10, 11, v. Bibl. II *n.*

Many other symptoms are recorded in both these provings, but they are, by the present writer, considered not reliable.

10. Dr. OATES having frequently witnessed the good effect of the use of alcohol after bites of venomous animals, and particularly after those of rattlesnakes; and perceiving that not only was the action of the poison arrested, but that under these circumstances the system was scarcely susceptible of being intoxicated with alcohol in any form, he was desirous of reversing the experiment by watching the effects of the poison when introduced into the system of a person already thoroughly intoxicated. This experiment he performed through the stomach instead of through the circulation direct. For this purpose he carefully extracted a small quantity of venom from a healthy rattlesnake, and compounded it into pills with bread-crumb. He then intoxicated himself considerably with brandy; after this he swallowed one of the pills. Its effect was to soon diminish the pulse; and although the intoxication was pretty deep, three of the pills so reduced the pulse and depressed the whole system that, for danger of collapse, powerful stimulants had to be resorted to. This, and other subsequent trials, fully satisfied him of the profound sedative action of rattlesnake venom, which he thought was scarcely equalled, in this respect, by any other substance. Given by W. J. BURNETT, M.D. in *Proc. Bost. Soc. of Nat. Hist.*, vol. iv, p. 323, 1854-6.

11. Dr. WALLACE writes: "In view of the fact that carbonic acid gas, so deleterious in the lungs, is innocent, nay salutary, in the stomach, I made myself and others subjects of experiments with the poison of the rattlesnake (*Crotalus horridus*); and I extended the experiments further on myself than on the others. This animal substance is the true Samson of the materia medica, and I anticipate the time when rattlesnakes will be reared for medicinal purposes as the poppy and the palma christi are now." "I mixed," he continues, "with some cheese, by friction in a glass mortar with a pestle, the bags, venom and all, taken from the fangs of a large and vigorous rattlesnake; and then divided the mass into one hundred pills. Of these I took, sometimes one, at other times two, or three or four pills a day. A general dropsy succeeded the first state of heavenly sensations, which has not, even to this day, fully gone off; being, even now, March, 1827, subject to swellings in the evening."—JAMES WESTWOOD WALLACE, *Tanquier, Virginia*, 1824; *Coxe's Dispensatory*, 1827, p. 664.

On this, Dr. S. Weir Mitchell writes to the editor of the *Philadelphia Medical Times* [vol. i, p. 101]: "Dr. Wallace's 'Provings' of Crotalus Venom seem to me worthy of preservation."

Dr. Wallace goes on to write: "The diseases of the lymphatic and arterial systems are never benefited by rattlesnake poison; but the nervous and muscular systems are speedily roused into action. Palsy is much benefited; old rheumatisms are removed or relieved; the passions of the mind are wonderfully excited; delirium in typhus fever, continued muttering (typhomania) is almost immediately removed, and a serene

mind, expressive of pleasure, follows ; melancholy is quickly changed into gay anticipations ; old sores are uniformly injured, on one occasion an old cicatrix opened, and was difficult to heal afterwards. The intellectual powers become improved."

11 *a*. "Dr. HERING, of Surinam, took, at different times, various doses of the poison of a rattlesnake (*Crotalus mutus*) mixed with water, and suffered from its effects for upwards of eight succeeding days. These effects manifested themselves by pains in the larynx and other parts of the body, by an increased secretion of mucus in the membranes of the nose and œsophagus, and by frequent diarrhœa accompanied by pain in the rectum. To these symptoms were added several others of a rather curious kind, attributable to the influence which the poison seemed to exercise even over the moral faculties."—PROF. JAMES WILSON, F.R.S., Edin., *Encyclopædia Britannica*, 7th ed., xx, 127, Art. "Serpents," 1842.

12. KITTEN.—Four drops of pure venom, which had been preserved in glycerine, were dissolved in a drachm of distilled water, and poured down the throat of a kitten, about 10 a.m. Sept., 1878. The kitten shortly afterwards began to tremble, and did so quite visibly for five minutes : at the sixth minute it mewed quite distressingly, and appeared very uncomfortable. After eight minutes it crouched down and partially closed its eyes : and after twelve minutes it lay down : it lay quiet and was loath to be roused up ; after twenty minutes it revived a good deal, and seemed very much distressed ; and on the room door being opened it ran away as if frightened. The distress and restlessness continued, and at the thirtieth minute, on being taken back into the room, it lay down as if dull, heavy, stupid and sleepy ; and on being petted it appeared snappish ; it remained much the same for the day, and in the evening it vomited, which it had never done before. The next day it appeared somewhat dull, quiet and snappish, but nothing otherwise wrong.—*Brit Jour. Hom.*, xli, 33, 1883.

13. AN INFANT.—Dr. Barstow writes to Dr. J. R. Coxe [of Coxe's *Dispensatory*] Wilkesbarre, Pa., May 27th, 1806. "Sometime in the summer of 1801, the wife of Mr. Alfred Beeman, of Braintrim, Luzerne County, Pa. was bitten by a rattlesnake. She was then in the fourth or fifth month of pregnancy. After a considerable degree of the common consequences of such an accident had occurred, she at length recovered. At the full time she was safely delivered. The child was apparently healthy ; but immediately after being allowed to suckle it assumed the hues of a rattlesnake, swelled very much, and soon died.

"14. A PUPPY was then procured and put to the breasts ; it died in two days with the same symptoms.

"15. A LAMB was tried next ; and, in succession, one puppy and three lambs shared the same fate.

"Another puppy was procured : this exhibited but little of the symptoms, and did not die. The woman all this time was as well as is usual after confinement.

"In the spring of 1803 I was called to see Mrs. Beeman, soon after another birth. She had strong apprehensions that it would be unsafe

to put the child to the breast; but was eventually prevailed on to make the experiment; and no disagreeable consequences resulted.

"These statements may be verified by reference to Mr. and Mrs. Beeman, and H. V. Champin, Esq.; as well as other persons in the town of Braintrim. Yours, &c. S. T. BARSTOW, M.D. Dr. J. R. Coxe." [Coxe's *Dispensatory*, 1831, p. 738.]

16. A COLT.—A Cowbridge correspondent writes: "A valuable mare belonging to Mr. Davies, of Ystradown, was recently bitten by a rattlesnake during the night. On the following morning a colt, which the mare had been suckling, was found dead, the virus having apparently been communicated from one animal to the other in the milk. The application of vigorous restoratives were necessary to save the life of the mare." (Newspaper.) *Brit. Jour. Hom.*, xli, 34, 1883.

B. PHYSIOLOGICAL EXPERIMENTS.

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1. JOHN W. HAYWARD, M.D.; October 20th, 1882, being in usual good health, at 9.30 a.m., with a perfectly clean lancet, I scratched the cuticle off a space the size of a shilling on inside of left wrist, without making blood flow. I then rubbed into the place about a sixth of a drop of a mixture of Crotalus venom and glycerine, half and half. Immediately blood began to flow excessively, and a pricking smarting pain occurred in the spot, and lasted nearly a minute. The part also immediately began to swell like a wheal of urticaria, quite raised and hard with sharply defined edges; and within five minutes it had reached the size of a florin; and it continued to swell slowly during the next half hour; finally reaching the size of half a crown. After ten minutes my attention was arrested by a sudden dig at the heart, and I found my pulse was 80, its usual number being 70. At the end of quarter of an hour there was a quivering sensation in the epigastrium, with slight nausea. At the end of half an hour the pulse had fallen to 60, was small, soft, empty, and very easily compressible; there were frequent sneezing and much catarrhal irritation in the nose, with a faint, sinking sensation in epigastrium. After an hour and a half the swelling on wrist had smoothed down, and was soft: but no less in circumference. I now went out, and was too busily occupied to notice symptoms; except a great craving for stimulants, especially wine, but did not take any; though on seeing some at a patient's house could scarcely resist asking for it. At 2.30, when sitting writing, had a sudden attack of vertigo, and nearly fell off my chair, and for some time had to make

considerable effort to maintain equilibrium. At 4.30 had a full congested feel in front part of brain, lasting for some time. In the evening I became conscious that during the day urination had been seldom, and urine scanty. During the night I dreamt much, not unpleasant. I awoke in the morning of 21st Oct., with same congested feeling in whole front part of brain; and a really aching pain, especially over left eye; these two last symptoms went away after having been awake for about half an hour. On rising did not feel the usual necessity to urinate, and on attempting noticed that the urine passed the previous night and this morning, together made but a small quantity, and looked concentrated, and was of very high colour; these characters were so evident as quite to arrest my attention; so I tested the urine, and I found sp. gr. 1031; on boiling it became paler and of a greenish colour, but a little darker again on addition of nitric acid; remaining clear. Another portion, on addition of caustic potash, became milky; and on boiling became darker colour and more green than with nitric acid, and the milkiness became a flocculent brown deposit, under microscope non-crystalline. The specimen boiled with caustic potash retained its greenish-yellow colour, but that with nitric acid lost it in half an hour, and looked then of lighter colour than normal. This morning, Oct. 21st, the left wrist felt as if there were some painful swelling amongst the deep-seated structures, but the skin had its natural appearance, except that the scratches were very red and visible: appetite, taste and general feeling normal; perhaps a little more buoyant than usual, and more pleasure in exertion. At 5 p.m. on this (the second) day, urine appeared rather copious and of light colour, though had not drunk more than usual: sp. gr. was 1014. Oct. 22nd.—Night and morning urine rather copious, sp. gr. 1018. Mark on arm still full size and looks dry and rough, as if threatening scaliness; and the scratches are still very red. 23rd.—Awoke this morning with severe dull pain in whole front part of brain, as if congested; especially under surface of left frontal lobe; also sharp pain in small spot in centre of left occiput; these both disappeared after being awake about half an hour. On a little exertion the heart beat rapidly, and with it there was an aching at the point of left scapula, as if deep internally, not superficial; these subsided shortly after the exertion was over. Urine appeared normal; sp. gr. not taken. 24th.—Same heavy, dull frontal headache on awaking, but it went away after 15 min.; urine clear and normal quantity; sp. gr. 1020; rheumatic pain in both wrists, elbows and ankles, all day. 25th.—Some dull frontal headache on awaking, but it went away after 10 min.: urine rather scanty; sp. gr. 1022; still some rheumatic pain about same joints. During this day noticed myself making several absurd mistakes in spelling, especially in writing out some symptoms, having to write some very familiar words three times over, thinking of the proper letter, but writing a wrong one. 26th.—On turning to lie on left side, early morning, felt as if whole heart were very tender, so that I could not lie on that side, though accustomed to sleep on it; tried it several times before rising. Had no headache on awaking, but skin of palms felt and looked dry and stiff, like thin dry parchment, with some feeling of heat in them. During the day

noticed an occasional mistake in spelling; and during evening frequent tickling deep in right meatus auditorius. 27th.—Languid and reluctant to rise, and hesitated to have my usual cold bath; urine scanty, sp. gr. 1022. 20th.—Languor and reluctance to rise. After this was prevented making observations until Nov. 11th, when I noted down that during last two weeks I had felt weak and not equal to exertion; there had been a sense of weakness about heart especially, and it had beaten quickly on exertion; and I had been more easily out of breath than usual on ascending a hill. Several small hard itching tubercles, each the size of a pea, had appeared *in* the skin of calf of legs; especially left one. The thighs, especially left one, had been and were painful as if deep-seated muscles were tender, especially noticeable when thigh was resting on edge of chair, and on walking. My singlets, the last two weeks, have been stained a reddish orange under arms, as if by the perspiration from axillæ. 25th.—The tubercles on calves still present, and still itch; but no new ones have appeared; the tenderness of thighs gone gradually worse, so as now to interfere much with walking and sitting, as though deep-seated muscles were inflamed, or suppurating. I was now driven to rub thighs occasionally with Arnica tincture the next three days; this afforded some relief. Dec. 2nd.—Still some tenderness of the left thigh; some of the tubercles have disappeared. 9th.—Thighs not painful, and tubercles gone; they gradually came to surface and scaled away with the scratching.

P.S. Jan. 4th, 1882.—The foregoing symptoms were most certainly results of the Crotalus venom, for I never had them before or afterwards. HAYWARD (MS.).

2. E. D—, a young lady, aged 25. Sunday, Dec. 17th, 1882; at 3 p.m. application of about a sixth of a drop of a mixture of venom and glycerine—1 to 3—to a small spot on right wrist, from which cuticle had been scraped without drawing blood. Immediately blood began to flow, and the part to swell and smart; the blood oozed out in many small points. "After about two hours, whilst sitting, giddiness came on, and was so great that I feared falling off the seat, and so removed to an arm-chair; it was relieved by resting head and keeping it still, but recurred on the slightest movement. Whilst sitting on the chair heaviness of the head came on, so much that the head felt as if it would tumble about; as if muscles of neck were too weak to support it, and required the assistance of the hands. Struggled against these two symptoms during the evening, but was eventually driven to retire to bed early in order to lay the head down; which relieved both symptoms. Slept as usual; and awoke on Monday morning without either giddiness or heaviness of head; but after breakfast noticed that I could not think, comprehend, or remember distinctly; could not as usual hold my mind to a subject; and all forenoon could not as usual comprehend or follow conversation; indeed, appeared so dull and stupid that my sister laughed at me; perception appeared clouded, so that on walking in the street would have been run over, but for my sister's watchfulness; memory was so affected that after getting into a shop found I had forgotten what I had gone for. In the evening had severe sharp shooting, rather burning pain, repeating at short intervals; apparently

starting about left side of womb, and passing upwards to region of transverse colon, and there shooting or cutting across, as if from both sides towards centre; thence passing up left side of trunk to face and temple as a sharp, cutting, intermittent, neuralgic pain; and across middle of forehead there was a heavy, dull, continuous pain; there was also the same mental dulness. The sharp, shooting pain in temple lasted about an hour; but the dull, heavy, frontal headache only disappeared after going to sleep. Slept as usual, and awoke on Tuesday morning in my usual health; and I remained so; but on Saturday evening the above-named dull frontal headache returned, and lasted until I went to sleep.

These symptoms were quite strange to me; never had them before or since."—HAYWARD (MS.).

3 *a*. SUMMARY OF THE EFFECTS PRODUCED BY THE INOCULATIONS PRACTISED BY DR. MANZINI.

"Intrinsically considered, the inoculation fulfilled its promises, and produced phenomena analogous to yellow fever, just as vaccination produces symptoms similar to smallpox. . . . . The symptoms of the inoculation appeared in the following order. At the moment of the inoculation there was vertigo, which soon passed away. There was also a nervous trembling, which is rarer, but which lasts a longer time. After 7 hours the pulse is permanently modified; it is either too frequent or too slow, stronger or weaker. In 11 hours there is febrile heat. At the end of 14 hours, headache, want of appetite, and thirst. At the end of 16 hours, red countenance, injection of the conjunctiva, epiphora. The swelling of the gums is observed from the commencement. At the expiration of 18 hours, pain in the gums, the margins of which are reddened around the teeth; pain of the salivary glands, and in the direction of the different nervous branches of the face and teeth. In 19 hours, pains in lower jaw and in the direction of the submaxillary nerve, lassitude. In 20 hours, bitter taste, drowsiness, coryza, and œdema of the face. In 22 hours constrictive sensation of the throat, without any visible alteration of the mucous membrane. In 23 hours yellow jaundice. In 24 hours, hæmorrhage of the gums. In 28 hours, yellowness of the sclerotic coat of the eyes, shivering. In 29 hours, angina tonsillaris. In 30 hours, pain in the kidneys. In 36 hours, swelling of the eyelids. In 38 hours, pain in the muscles and joints. In 40 hours, toothache. In 72 hours, swelling of the lower lip. At different hours, sexual excitements. During convalescence, itching of skin, cutaneous eruptions of various kinds . . .

Pulse.—In the majority of the cases the inoculation produced a diminution in the frequency of the pulse and, what is most remarkable, the sixty-eight who showed this diminution were precisely those who had the most frequent pulse before being inoculated [v. Ca 6, l. 5, p. 239] and those who showed an acceleration had formerly only 69 pulsations a minute. . . . . The decrease in the force of the pulse is also very marked. Nearly all the cases show at one time a very noticeable feebleness and sinking, alternating with acceleration, each lasting six hours on an average.

Headache.—Headache is one of the most common symptoms of the inoculation. It lasts, on an average, twenty-one hours. It can exist without any alteration of the pulse. It generally occupies the frontal and orbital regions.

Heat.—The heat does not seem to be owing to the increase of the pulse. It was even perceived in those cases where the pulse sank.

Throat.—The deglutition was difficult in all cases, and the tongue was more or less coated.

Skin.—After the cessation of the more acute symptoms it was very common to witness an itching of the skin, of which the inoculated complained very much.

Another group of phenomena was constituted by the neuralgic pains in the head and neck.

In many cases there were observed erections at night.

The intermittent character of several of the symptoms is one of the most interesting and important of the points observed.

Numerical Recapitulation.

The circulation was modified in	183	out of	187
Headache existed in	160	„	187
The face was changed in	54	„	74
The gums were affected in	74	„	74
Colics existed in	52	„	74
Swellings of salivary glands in	5	„	74
Pain in lower jaw present in	10	„	74
Lassitude in	59	„	74
Drowsiness in	10	„	74
Coryza in	16	„	74
Bitter taste in	54	„	74
Spasm of throat in	14	„	74
Jaundice in	16	„	74
Coldness in	13	„	74
Heat in	46	„	74
Perspiration in	17	„	74
Angina tonsillaris in	17	„	74
Pains in muscles and joints in	7	„	74

In a Sister of Charity, inoculated, there was a complete pleurisy, with fever of a remittent type.

Nothing, however, was of higher interest than the fevers from which the inoculated suffered. They resembled yellow fever in its initiatory stage. Nothing was wanting—expression of countenance, pain in loins, headache, the symptoms of the gums, and those fevers which made their appearance in such an alarming manner did not last longer, in five out of seven cases, than from twelve to forty-eight hours."—NEIDHARD, pp. 67, 68, 69, 70, 76, (63).

3. A KITTEN, Sept. 21st, 1874.—I injected under skin of right shoulder one drop of Crot. 1^x, with four drops of distilled water, at 10 a.m. After two minutes her right leg appeared to be in great pain,

and she held it up, and mewed distressingly and continuously; she passed into a corner and sat on the root of her tail; then, keeping her right paw off the table, she pushed herself backwards; then tried to walk about, which she did with difficulty; she then crept to a towel and sat upon it. After three minutes more she moved again to the corner, and sat down panting and breathing laboriously; she appeared restless, moved about for a while, and then sat down quiet and closed her eyes, still holding her leg up. After four minutes more she again pushed herself backwards into the corner; and after another three minutes she was again restless and pawed at her throat and mouth, as if they were uncomfortable; her mewing was evidently weaker; she breathed quickly and closed her eyes, but after another two minutes her respiration became more quick, her eyes remaining closed. After a few minutes more she stretched herself out and lay quiet. I was now called out and had to leave her for three hours. I returned at 2.15 p.m. and found her looking lively and apparently nearly all right again. She had passed urine. At 2.20 I injected five drops of 1^{x}, with five drops of distilled water, under the skin of her back. Within two minutes she trembled all over and breathed very rapidly, and she refused to walk about even when urged to do so: she became quiet and stupid, and after three minutes more lay down on her belly; after another two minutes, on being roused, she moved sideways, and mewed distressingly. I had now to leave her again. On returning, after three hours, I found her dead. The only local evidences of the poisoning were some softening and discoloration at the points of injection. She was not opened.—HAYWARD (MS.).

4. PIGEON.—"This manœuvre . . . . . secured the passage of the venom—two drops with a little water—into the smaller bronchi, and perhaps even into the air-vesicles themselves. A good deal of wheezing and coughing ensued, and within ten minutes the pigeon became drowsy, rocked to and fro, and at the close of thirty-eight minutes fell down. Convulsions followed at the forty-third minute, and terminated in death at the forty-ninth.

P.M. Section.—No lesions were visible, except in the lungs, both of which contained large extravasations of dark blood, soaked through their sinuses to such an extent as to make it impossible to say whether or not it was fluid or coagulated.

5. PIGEON.—Another pigeon was treated in same manner. Death, without precedent convulsions, took place at the close of eight hours and a half.

P.M. Section.—The blood was diffluent in every locality examined, and the left lung contained a large extravasation of dark blood."—MITCHELL'S *Researches*, p. 77.

6. FROG.—A small quantity of dried venom was inserted into the muscles of the back. On inspection twenty-one hours afterwards, the frog was found seated and quiet. During half an hour no respiration occurred. Upon touching the eye the frog breathed once and moved its entire body, after which no further motion could be provoked.—*Frog*, viii, MITCHELL, p. 59.

7. CAT.—August 6th, 1874.—A cat was chloralised, and part of

the mesentery placed under the microscope on the warm stage. Crotalus poison, diluted with water, was then applied to the mesentery, and its effects watched. The white corpuscles were observed to cling in quantities to the walls of the vessels, and as the current of blood hurried through them, some masses of pale matter, like aggregations of white corpuscles, were observed to pass with the stream; very soon marked extravasation of red corpuscles took place, and to the naked eye the mesentery became discoloured by patches of ecchymosis in the course of the small blood-vessels, like the foliage on the branches of a tree. There could be no doubt that the local action of the poison had a marked effect in producing extravasation of blood. Exp. xii; BRUNTON and FAYRER, *Proc. Roy. Soc.*, xxiii, 270, 1875.

8. CAT.—A similar experiment was repeated on another part of the mesentery of the same cat with cobra-poison, exactly as the Crotalus poison had been applied in the previous experiment. This was carefully watched, but no extravasation took place; there was a marked difference in the result of the application of the two poisons, at all events as far as these two experiments were concerned. Exp. xiii, *B. and F.* ibid., p. 271.

9. CAT.—August 12th, 1874. A cat was chloralized at 2.30 p.m. Mesentery exposed and placed under microscope on warm stage. Crotalus poison applied to mesentery: circulation soon diminished in some vessels, but continued vigorously in others. Isolated extravasated patches soon made their appearance of a triangular form, others followed and coalesced with these until a network was formed in the course of the vessels all over the field. The extravasation soon became general, the circulation still continuing slow.—Exp. xiv, *B. and F.*, ibid. 271.

10. GUINEA PIG.—June 10th, 1874. Quarter of a grain (·015 gramme) of dried Crotalus venom was carefully weighed and diluted, with ten drops of distilled water, and injected into the peritoneal cavity of a full-grown guinea-pig at 1.52 p.m. 1.55. Muscular twitchings of head and neck. 2 p.m. Startings and twitchings continue. It gives faint squeaks occasionally as though the sudden startings which occur at intervals of 5 or 6 seconds cause pain. 2.5. Twitchings continue. 2.8. Very restless; twitchings going on, but no paralysis yet. 2.17. The same. 2.25. Restless and weaker, but still moves freely on being roused. 2.42. Sluggish; drags the hind legs. 2.58. Weaker; rolls partially over on one side, but can run when roused. 3.3. Lying on side, but can be roused; is partially paralysed in hind legs. Respiration abdominal and hurried. 3.5. Nearly quite paralysed; is roused with difficulty. 3.7. Can still be raised. Abdomen distended and painful; cries out when it is touched as though peritonitis was setting in. 3.12. Can be roused with difficulty; respiration hurried; convulsive movements of fore legs and neck. Can still stagger a few paces, but co-ordination of muscular power much diminished. 3.30. In violent convulsions. 3.38. Convulsions continue. 3.45. Quiet; paralysed, but reflex action still continues. 3.55. Dead in 2 hours and 3 minutes.

Post-mortem.—3.56. Electrodes in cord cause twitchings of muscles of the back, and very slightly in those of the legs; the cord was

evidently all but paralysed. Muscular fibre contracts freely to direct stimulus of current. The intestines were ecchymosed and congested. There were effusions of red serum into the peritoneal cavity, and much ecchymosis of peritoneum, and sub-peritoneal and intra-muscular areolar tissue. Peristaltic action continued faintly. 4 p.m. The heart has ceased to contract 4 minutes after apparent death; it continued to contract, especially the auricles, for part (not the whole) of the time. The blood removed from the heart cavities and vena cava rapidly formed a firm coagulum in a glass receiver. The electrodes applied to the sciatic showed that the nerve trunk, as well as the spinal cord, was paralysed. Exp. iii, *B. and F.*, ibid., p. 265.

11. GUINEA-PIG.—June 10th. A grain of dried Crotalus-poison diluted with water was injected into the peritoneum of a full-grown guinea-pig at 2.40 p.m. Twitchings began almost immediately. 3.3. Restless; startings; staggers in hind legs. 3.20. Very weak, especially in hind-quarters. General paralysis setting in. Abdomen distended and very tender. 3.30. In convulsions. Still feels when the abdomen is touched. 3.37. Paralysed; but feels the touch. Reflex well-marked. 3.45. Apparently dead in 65 minutes.

Post mortem.—3.48. Cavities opened. Auricles flickering. Blood from heart and great vessels coagulated firmly. Abdominal cavity and areolar tissue infiltrated with bloody serum. Much ecchymosis of peritoneum and intestines, but not of lungs. Cord and nerves paralysed. Muscles contract vigorously to induced current.—Exp. v, *B. and F.*, ibid., p. 267.

12. GUINEA-PIG.—June 9th, 1874. ·015 gramme ($\frac{1}{4}$ gr.) of the dried Crotalus-poison, diluted with 1 cub. centim. of distilled water, was hypodermically injected into the thigh of a full grown guinea-pig at 11.30 a.m. Restlessness and muscular twitchings of the body generally soon commenced; these passed away, but the animal became sluggish, in which condition it remained all night, and died at about 9 a.m. the next morning. No convulsions were observed; but as the animal was not seen during a short time previous to death, they cannot be said positively not to have occurred; nor is it known if the heart ceased to beat at the moment when apparent death took place.

Post-mortem.—The injected limb became much swollen, infiltrated and discoloured with sanguineo-serous effusion. The intestines were not ecchymosed; there was much sanguinolent fluid and also blood effused into the abdominal areolar tissue.—Exp. i, *B. and F.*, ibid., p. 264.

13. GUINEA-PIG.—A few drops of watery Crotalus-poison, of the same strength as used in Exp. 1, were injected under the skin of a guinea-pig's thigh at 12.16 noon. 12.17. Marked twitchings of head and hind legs, very similar to those produced in some cases of cobra-poisoning. 12.18. Hind leg (poisoned one) weak. 12.20. Twitchings much increased, now mainly in head and neck, not so much in hind-legs. 12.28. Guinea-pig quiet, but with occasional twitchings: sluggish and disinclined to move. 1.30. Sluggish in moving; can still move about, though disinclined to do so. The punctured thigh is very blue.

The rest of the notes of the experiment were lost. The animal died. Exp. ii., *B. and F.*, ibid., p. 264.

14. RABBIT.—Quarter grain of the dried Crotalus-poison, dissolved in 1 cub. centim. of distilled water. The jugular vein of a large white rabbit was exposed, and the above solution was injected into it at 1.50 p.m. At 1.51. Violent convulsions, with opisthotonos. At 1.53 apparently quite dead.

Post mortem.—Artificial respiration commenced immediately. Heart acting still, though feebly, and with irregular flickering contractions. Spinal cord exposed. Electrodes applied; no reaction. 2.12. Heart still contracting feebly. 2.15. Faint contractions of the heart still observable. Ventricles punctured, and blood withdrawn. Peristaltic action has ceased. 2.20. Feeble cardiac movements continue. 2.21. Heart has now ceased. Muscles react to direct current. Death caused by rapid paralysis of medulla and cord. The blood taken from the heart and great vessels did not coagulate. At 4 p.m. it was still fluid, though very florid in colour. Examined under the microscope nearly two hours after apparent death, the white corpuscles appeared natural; the red corpuscles not in rouleaux, and very much crenated, though a few retained their natural contour. The blood was neutral to test-paper. Exp. vi, *B. and F.*, ibid., p. 267.

15. CAT.—June 24th, 1874. A full-grown cat was chloralised at 1.20 p.m. Quarter of grain of dried Crotalus-poison, diluted with 1 cub. centim. of water, was injected into the jugular vein. The respirations were immediately quickened. 1.21. Twitching of muscles generally. 1.22. Efforts to vomit. Forcible extension of limbs. 1.24. Hurried respiration and retching. Reflex action perfect. 1.30. Muscular twitching and tetanic stretching of limbs. Efforts to vomit continue. Micturition. Rolls over on the ground. 1.34. Ataxy. Staggers when walking, which it can only do for a few paces. Peculiar twitching of diaphragm; not synchronous with respiratory movements. Rolls over on its side. 2 p.m. In the same state. 2.8. Injected $\frac{1}{8}$ grain more of the poison into the same jugular vein. The animal immediately got up and walked, comparatively steadily, for several paces, as though it had been stimulated, and then rolled over. 2.16. Twitching of the diaphragm continues at the rate of 150 per minute. 2.18. Again got up and walked for a few paces; but it is gradually becoming more paralysed. 2.44. Violent tetanic spasms of limbs. Reflex action diminished. 2.46. Reflex action gone from eyes. Deep sighing respiration. 2.47. Convulsions. Death.

Post mortem.—Body opened immediately. Lungs deeply congested and much ecchymosed. Deep red gelatinous effusion all about the roots of the lungs. Heart contracting. Electrodes applied to phrenic caused vigorous contraction of diaphragm. 2.50. Heart ceased to contract three minutes after respiration had ceased. 2.52. Electrodes in cord, do not cause contraction of limbs. 2.54. The sciatic nerve, when irritated, conveys impressions; muscles of legs contract. Blood from the heart and great vessels did not form a coagulum, but remained permanently fluid. Red corpuscles of blood were much crenated.

30 Death in this case appeared to be caused through the medulla.—Exp. ix, *B. and F.*, ibid., p. 269.

16. FROG.—June 15th, 1874. Action of Crotalus-poison on the frog. A frog's hind leg was ligatured, excluding the sciatic nerve. A solution of Crotalus-poison was injected into the lymph-sac at 12.32 5 p.m. 2.30. Sluggish, but not otherwise affected. 3.15. In the same condition. June 16th.—12.3, noon. Sluggish, but can still move. 17th. Found dead this morning early; pupils contracted. Electrodes applied; no reaction in either cord or nerves on either side to the strongest current. The frog may have been dead some hours.—Exp. x, *B. and F.*, ibid., p. 270.

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1. *A mild case*—A GIRL, æt. 14. Bitten about 7 o'clock p.m., in end of right ring finger. Mr. Desprez was called to her at 3 o'clock next morning, and he found her hand, forearm, arm and shoulder much swollen; and a dark ecchymosed line running from root of finger almost to shoulder-joint. The inside of bitten finger was covered, as far up as the second joint, with blisters filled with dark fluid blood. Whiskey was freely given; capsicum and ammonia were also exhibited; but the patient did not improve, but rather the contrary, for the inside of arm and belly of the biceps became very black. At 4 o'clock next day, that is 21 hours after the bite, Bibron's antidote (Bromine) was given; and by 7 o'clock the swelling was reduced, and the patient gradually improved, so that in about ten days she was quite well.—Mr. W. DESPREZ, of Alabama, U. S. A. *London Medical Times and Gazette*, 1869, vol. i, p. 25.

2. *A severe case*—MISS H. BIGGS. Bitten July 24th, 1830, at about 6 a.m. She received two wounds; one on the instep and the other on great toe of left foot. When seen twenty-six hours after the bite, her body was considerably swollen, her eyes being almost closed with the swelling of the face; the tongue was tumid; deglutition was somewhat difficult; and articulation was indistinct. Her left leg, as high up as the hip, was enormously distended, and threatened with mortification, the skin having a shining appearance with the swelling and discoloration; it was black on the outside, and mottled on the inside, with black and yellow spots, so that one might have fancied it resembled the skin of the snake. The bitten part was very painful; and the inguinal glands on that side were much enlarged; the pulse was low, and about 60; and the surface of the body was cold. She felt extreme nausea, and vomited on making the least exertion. Great thirst was an attendant symptom from the first, and she had drunk large quantities of water. Her bowels were constipated; her mind was not in the least affected.

Long scarifications were made, and large blisters applied over the limb. Liquid ammonia was given internally, in doses of two drachms every two hours, without any apparent benefit. Oxide of arsenic was afterwards exhibited, a quarter of a grain every fifteen minutes—eight doses—with improvement, checking the nausea and swelling, so that she appeared to be out of danger within twenty-four hours after the arsenical treatment was begun. The blisters were left on the limb for twenty-four hours and then removed, and the vesicles opened, letting out from one and a half to two pints of fluid of a dark greenish colour. She was restored to her usual state within three weeks.—H. B. PHILLIPS. *American Journal of Medical Sciences*, vol. viii, p. 540, 1831.

3. *A severe case*—Mr. B—.—Bitten just above the heel. The usual symptoms of most acute pain and great swelling followed immediately. He, however, succeeded in reaching his home, three quarters of a mile distant, complaining then of blindness and universal pain. Brandy was given to him to the extent of a quart in the course of an hour; this produced a little nausea, but not the least intoxication. The stimulant was kept up in the same quantity (? J. W. H.) during the ensuing forty-eight hours, with a gradual passing off of the local

and other symptoms. He kept his room the three following days, complaining only of a general soreness. A few weeks after this all his hair fell off.—Dr. DEARING: given by Dr. W. J. BURNETT in *Proceedings of Boston Society of Natural History*, vol. iv, p. 313, 1854—6.

4. *A moderately severe case*—A BOY, aged 12 years. When seen within a few minutes after the bite, the gums were bleeding, and the eyes were weeping blood. The blood appeared to be dissolved, so that it readily passed out of its proper vessels; the limb was painful, but not much swollen. The part was scarified, and Liq. Amm. freely applied; this relieved the pain like a charm; and the nausea and the distressed anxious feeling soon left him; and by frequently applying the ammonia during the day and night the boy was perfectly restored in thirty hours. A. G. MILLER; *Boston Med. and Surg. Journal*, 1833, vol. viii, p. 240.

5. *An acute severe case; rapid recovery*—Miss R—. A young lady, aged 17 years; bitten on left instep, both fangs entering, about 5 p.m., Sept. 20th, 1852. Dr. Atchison reports: "I arrived about two hours and a half after the accident, and found her almost moribund; pulse wavy and scarcely perceptible; the surface cold and bathed in perspiration; face swollen, with a besotted expression; mind wandering; pupils dilated, and she could not see, declaring it was dark and that candles were burning in the room; asked frequently if it were not raining, although the evening was calm and clear. The two little punctures on the instep were visible, and round each there was a greenish areola, with some puffiness. I administered brandy, half a glass at once; and the wound was freely scarified and cupped, and the extremity placed in a hot saline bath. Twenty grains of carbonate of ammonia were given, but immediately thrown up, together with the contents of the stomach, coloured bright grass green. An ordinary glass of whiskey was now given, and the patient drank it with avidity and asked for more. A glass of whiskey and twenty grains of carbonate of ammonia were given every half hour alternately, until three pints of the former and eighty grains of the latter had been administered; and, what is very remarkable, not the slightest intoxication ensued; on the contrary, the urgent and alarming symptoms gave way; warmth returned to the surface; the pulse returned to the wrist; the mind was called back from its wanderings; and she fell into a quiet sleep, from which she awoke at 5 a.m., complaining of intense pain in the foot, shooting up the inside of the leg to the knee; for this she had quarter of a grain of morphia, and fomentation of laudanum and camphor, followed by a poultice of linseed, with the effect of entire relief of the pain; and she was nearly well next day.

"The instinctive avidity and importunity with which this delicately nurtured young lady took so large a quantity of spirits—sufficient under ordinary circumstances to have killed a regular *habitué*—would excite astonishment if we did not reflect that it was antagonised by the depressing effect of the poison on the nervous system. But the most interesting feature in this case remains to be told: Miss R—, at the time she was bitten, was the subject of well-marked whooping-cough, which was then epidemic in the neighbourhood; she had had the

disease about three weeks, consequently it was at its acmé; but on recovering from the effects of the poison, to her great surprise and gratification, her cough had disappeared also; nor did it return!"—THOMAS A. ATCHISON. *Boston Medical and Surgical Journal*, vol. xlviii, p. 200: from *Southern Journal of Medical and Physical Sciences*.

6. *A severe case*—FRANCISCO. "The subject of this case," writes Mr. Baillie, "was a strong muscular Indian peon, 45 years of age. He was about one hundred yards from the house when a rattlesnake wounded him. In a few seconds the pain extended up the limb, followed by loss of sight and a feeling of intoxication. The people observed him throwing his arms about him in a strange and violent manner, calling for assistance, and saying that some animal had bitten him. Before they could reach the place, he fell prostrate on the ground.

May 11.—Friday 7 p.m. Not more than fifteen or twenty minutes have elapsed since he was empoisoned. He is supported between two persons, and is completely powerless, having no control over the upper or lower extremities; the countenance is livid or darker than usual; appears in a lethargic state, requiring to be spoken to in a loud tone; but, when aroused, answers questions distinctly, complains of blindness, and severe pains in the right ankle and extending up the limbs and all over his body. There are two small punctured wounds, situated perpendicularly an inch apart, equi-distant between the tendo-achillis and the external malleolus. The extremities are cold, and the pulse is quite lost at the wrists. I directed the wounds to be bathed with lime-juice; and I administered Pulv. Ipecac. Comp., gr. x.

Half-past 7. The drowsiness has disappeared; he is now able to converse with his companions, the extremities are less cold, and a very slow, small, thread-like pulse is distinguishable; shortly after this he vomited with great violence (he dined at six o'clock). The bowels acted simultaneously, and his bladder expelled its contents. It appeared to me that an intense degree of gastro-intestinal irritation existed, manifested by spasmodic contractions of the alimentary canal and the bladder. Vomiting, tenesmus, and stranguary existed without intermission nearly two hours; the thirst was excessive, and the water he drank was immediately ejected, or passed in limpid urine. The quantity of urine secreted was really surprising. Once I endeavoured to control the spasms, and gave him tinct. opii, ℥50, which was not retained.

Half past 9. The vomiting has ceased; complains of pain in the stomach, and great thirst. Tenesmus and micturition disturb him every few minutes. The extremities are not very warm, pulse fuller but slow. Rep. tinct. opii, ℥50.

10. The pulse is improving, the extremities are warmer, and the pains are less.

Half-past 11. He has passed some blood with mucus per anum, and has also expectorated about half an ounce more of a florid colour with the sputa; he is extremely restless; has thrown off all his clothing, and rolls about in great agony. The pain is now concentrated at the epigastrium; the fingers are cold, and the general temperature of

the body is diminishing; the pulse is smaller, slow, and sinking. Rep. tinct. opii, ɱ60.

During the succeeding hour there was a gradual improvement of all the symptoms, and he finally ceased to answer me and fell asleep. The perspiration was suppressed from the commencement, the inspiration natural, and, until the last hour, his voice was clear and sonorous.

12th.—4 a.m. My patient is dressed and sitting in his hammock; the pulse is full and quick; he has been perspiring freely, and appears excited and loquacious. Ordered him some strong coffee with milk, and desired the people to leave him.

10 a.m. He has had some sleep, and is much better; complains of pain in the arms and wounded ankle; the latter is a little swelled and tender. Says, that with the *right* eye, he is unable to see objects. Has lost the power of raising the upper lid, owing to the levator muscle being paralysed. The conjunctiva is a little injected. There is a red zone a line and a half broad round the cornea. The pupil is extremely *contracted*, and the aqueous humour looks cloudy. The vision of the left eye is indistinct, as if a film was interposed between it and the object; the conjunctiva is less injected, the corneal zone is fainter, the pupil is of a grayish colour. To apply lime-juice to the forehead and temples frequently. Diet, chicken broth.

13th.—He has passed a good night; the pains are relieved; feels shooting pains in the wounds; can see a little with the right eye. To have animal food, and remain quiet.

14th.—He is considerably better. The amaurosis is rapidly disappearing; has been walking about the house with the aid of a stick.

15th.—He is quite well; the eyes have regained their natural appearance, and the vision is perfect. I saw him a month afterwards in good health and condition; he still complained of slight pains or twitchings in the wounded part, and I observed he did not bear the heel firmly on the ground."—ARTHUR BAILLIE, M.R.C.S., Lond.; *Lond. Med. Times*, vol. xx, p. 179, 1849, July—Dec.

7. *A severe case*—An IRISHMAN, æt. 23. Bitten about 11 a.m., May 18th, 1866, in the middle of left palm. The wound was cauterized with nitrate of silver; and whiskey given. When seen five hours afterwards he was found nearly comatose; the surface cold; the pulse imperceptible at the wrist; heart beats 55 in the minute; respirations 14, and laboured. Constant vomiting. Both hands and forearms much swollen and very painful; and the glands in left axilla swollen and tender. Ice was applied, and whiskey was given by the rectum because of the vomiting. The next day, the 19th, there was some cough with expectoration of bloody mucus. The swelling of the left forearm had extended to the arm, but that of the right only to the elbow. The pain was severe in the left arm, but only moderate in right. About the wound were several large vesicles filled with very dark bloody serum. He had had several bloody stools, but the urine was not bloody. The tongue was swollen to nearly twice its normal size. On the 20th he remained in much the same state, though he had lost the cough, and the expectoration was not bloody, and there was no blood in the stools. On the 21st the swelling was much less

in both arms; he had very little pain and was comparatively well. In the course of a few days more the swellings and pain had entirely subsided; and he was discharged, cured, on May 30th.—*New York Med. Journ.*, 1866, Nov., vol. ii, p. 140.

8. *A severe case.*—Dr. G. E. SHIPMAN bitten in hand. In giving his own case he says that in May, 1846, one morning in moving a piece of wood he felt a prick in left palm, and thought he had struck against a sharp splinter. On examination, however, he found he had been bitten by a rattlesnake. He caught the snake and stamped it out of shape, and in his anger threw stones on it until pain became so severe in his hand as to cause him to desist. He then went and told his wife: he remained with her for a while when, the pain increasing all the time, he examined his hand and found two little punctures in the palm, and a little blister; the pain was intensely burning. He tried Dr. Hering's plan of dry heat, but the pain increased so that he was obliged to give that up, and he became wild. A glass of salt and water being brought to him he drank it off, but observed that there was no taste of salt in it. This might, however, he thinks, have prevented the usual sickness that occurs in these cases, as he was not nauseated in the least. The pain increased all day, and there was intense restlessness, which was worse to bear than even the pain, so that he could neither sit, nor lie, nor stand, but paced up and down the house like one distracted, as indeed he was. He soaked his hand in lye water, and applied plantain and many other things until night. Some time in the course of the night he took a few doses of *arsenicum* 3 cent. trit.: this entirely removed the restlessness, but did not seem to touch the pain at all. The blister in the palm had gradually enlarged to the size of a good-sized pear; and on being opened the water that filled it scalded the parts it passed over just as boiling water would have done. The hand and arm began to swell during the first day; and on the second day the fingers became semiflexed on the palm and rigid; the hand flexed on the forearm and the forearm on the arm; and all were of a livid colour, black and blue, and cold. He got no sleep until the fourth or fifth night, when he put on a bread-and-milk poultice, after which he slept well as long as he kept the poultice moist, but on its becoming dry the hand became again too painful to allow him to sleep. The skin became extremely dry so that he had to keep the poultices on for several days, because when the skin was dry the pain was extreme. The hand desquamated several times, and part of the forearm also. His strength was so much reduced that it was three or four weeks before he felt like himself again.—Dr. G. E. SHIPMAN, 170 miles west of Chicago: *special communication* by DR. SHIPMAN.

9. *A severe case.*—A BOY, aged 15 years, bitten on the leg. When seen 36 hours after the bite the whole side up to the arm was greatly swollen, and all the side had become black with effused blood, so much so that those who saw him observed that he looked like the snake that had bitten him. He had constant retching to vomit, though but little was ejected. He appeared to be fast sinking with exhaustion. The whole side was bathed with alcohol, and Liq. Ammon. was given internally: this relieved the distressing sickness in a few minutes; and

in the course of a few days he was able to leave his room.—A. G. MILLER, *Boston Med. and Sur. Journal*, 1833, vol. viii, p. 240.

10. *A sharp case, 24 hours.*—ESSEN. MAYRANT reports: "One evening in September I was informed that ESSEN, a male servant, had been bitten by a rattlesnake and was dying. He had been brought to my house; and on going out to see him I found him extended, motionless and speechless, and his jaws locked; with a very feeble, fluttering, and scarcely perceptible pulse. I gave him brandy and pepper repeatedly: after taking more than a quart he spoke, in his native tongue. In the morning he was pretty well recovered, but in a state of considerable debility. Had taken three quarts of brandy in the night. Brandy and hartshorn were continued all day. On examining the wound I found no swelling of the part bitten; but the parts under the jaws and about the throat were so much tumefied that I was apprehensive the passage to the stomach would be closed.

"After recovery he stated that as soon as he felt himself bitten he took a rail from the fence near him and killed the snake, which was a very large one: his strength soon failed, however, so that he could not use the rail or make any exertion whatever. He was found in a few minutes, by the overlooker of the plantation, leaning on the fence and vomiting violently. On being asked why he did not call for assistance he said he felt as if his tongue and all round his throat were so tied up that he could not speak.

"In the morning he had no knowledge of being brought to the house, or of what had been done for him."—MAYRANT, in *American Medical Recorder*, vol. vi, p. 619, 1823.

11. *A sharp case.*—A NEGRO bitten by a rattlesnake was a few hours afterwards found in great pain about the chest, pulseless, and vomiting green fluid. Spirits and green pepper were administered in wineglassfuls until the pulse returned. After taking six glasses he was much better—the pains about the chest had abated, the vomiting had ceased, and the pulse had returned. He recovered in ten or twelve hours by the use of a quart of spirits.—MAYRANT, in *American Medical Recorder*, vol. vi, p. 619, 1823.

12. *A severe case.*—A WOMAN bitten in left foot just above heel. Vomiting commenced immediately, and within fifteen minutes there was pain in the whole head; great anxiety and uneasiness; violent thirst and diarrhœa; oppression of the chest, and violent burning pain in the trunk, especially lower part, increased by touch. Violent burning pain in whole left leg, and great swelling; also above bandage tied above the knee. The swelling spread over whole body, and not until some days afterwards had it begun to decrease, leaving marble-like, green, yellow, and bluish spots.—DETWILLER, in HERING *Symp.*, 3257.

13. *A severe case.*—A WOMAN stepping on her doorstep with bare foot on a rainy night in October, was bitten on great toe of right foot. She imagined she had been scratched by a young cat; so that terror and fear could not in this case have such influence as is usual in cases of snake bite, and could not therefore increase the danger.

Immediately she had walked five or six steps she fell down as if

fainting. She had violent burning pain in the leg of the bitten side, and great swelling, and burning sensation as far as the thigh. After five minutes there were violent pains in the front part of the head. After ten minutes violent vomiting of food [this lasted for several days, following each meal]. After one hour there was dryness in the throat, with violent thirst; and red, watery, tearful eyes. After eight hours much œdematous swelling of whole body. After ten hours the whole head, and especially the face, much swollen. Also burning pains in the trunk, lasting several days, with great sensibility, increased by touch. Great oppression of the chest with evident inflammation of the lungs, and of the bowels. Great languor and delirium. After ten hours the swelling gradually decreased; marble-like, green, yellow, and bluish spots remained, and only departed after the entire disappearance of the swelling. The swelling and discoloration extended to the loins of the bitten side.—DETWILLER, in HERING, *S.*, 1689.

14. *An acute severe case, three days.*—A NEGRESS bitten on left ankle. Dr. J. C. BLACKBURN, Flat Shoals, Georgia, reports: "I saw her eight hours after the wound had been inflicted: she was deathly sick: cold rigors were running over her; pulse 120, small, quick, and thread-like; indeed, I thought her moribund. The entire left leg was swollen to twice its normal size. I commenced giving her whiskey by the gill until two quarts had been given in twelve hours, and after discovering some symptoms of inebriation I desisted. Applied cupping glasses and warm poultices every hour. Within three days she was well."—J. C. BLACKBURN, M.D., in *Boston Medical and Surgical Journal*, vol. xlviii, p. 488.

15. *A prolonged case, mended on second day, decidedly better on third, well on sixth day.*—PATRICK BURNE, a young man, was bitten near second joint of left index finger, about 6 a.m., on 9th August, 1851. When seen about 4 p.m.—10 hours after bite—he was partially delirious; pulse very much exhausted, and ranging from 115 to 130; respiration difficult and hurried; skin hot and dry; eyes red and fiery; the hand, arm, and shoulder were swollen to a great degree; and the pain of the limb almost insufferable. Bled, cupped, and poulticed; with ammonia and ether internally. Aug. 10th.—Next day, no better; still delirious; pulse about same; had not slept any during the night, and had suffered excruciating pain every moment in night: still nausea; no abatement of swelling of the limb; arm, shoulder and upper portion of left side were thickly covered with small blisters filled with fluid of a yellowish colour. In addition to former treatment, he had now whiskey *ad libitum* until the system was under its influence. Aug. 11th.—Slight improvement was recognizable: pulse 100; swelling of arm and shoulder a little diminished; still delirious; and anxious and uneasy, and very restless, but dozes occasionally; skin still hot and dry. Same treatment continued, with the addition of some opium. Aug. 12th.—Really better; pulse less frequent; less restless, and but little pain; still delirious; occasionally slept a few minutes. Same treatment continued, with the addition of capsicum to the whiskey, and administering it without regard to quantity until the patient was fully under its influence; with morphia when necessary.

Aug. 13th.—Decided improvement; skin moist and quite natural: swelling of arm and shoulder subsided; the delirium had ceased, and he talked rationally; and he speedily recoved his usual health.—*Boston Medical and Surgical Journal*, vol. xlix, p. 506, from *Buffalo Med. Journ.*

16. *A prolonged case.*—Mr. BRIENTAL, writing out his own case, says he was bitten on the right hand, February 10th, 1746; and that he then ran to his quarters, sucking the wound and spitting out the saliva. This appeared to keep the hand easy; but his tongue and lips became stiff and numb, as if they had been poisoned. The first thing done was to apply a fowl: its belly was ripped up and it was placed on the wound alive like a poultice, and there tied fast. This must have drawn out some of the venom, for the fowl immediately swelled up and grew black and stank. He kept his elbow bent and his fingers up, to keep the poison from his arm, a band was tied round the arm; and thus he walked about. There was not much pain or swelling up to midnight. About midnight his hand grew cold and numb, and suddenly puffed up. He now grew desperate and furious, and slit up his fingers with a razor; this gave him some ease. He also slit up his hand on the back and cupped it, and drew out a quart or more of ugly poisonous slimy stuff. But his arm swelled notwithstanding all they did; he then got it tied quite tight, that all communication with the body might be interrupted; and it became almost void of feeling; yet it worked, jumped, writhed and twisted like a snake; and changed colors and became spotted; and grew painful in the bone. His tongue and lips swelled the first night, but were not very painful; occasioned only, he supposed, by his sucking the wound. The swelling of the arm having diminished to about half they untied the band; but in two hours all his right side was turned black, though only a little swelled, or pained. He bled at the mouth soon after, and became feverish; and continued feverish and spitting blood for four days. The pain continued to rage in the arm, and the fever to be violent, and by turns he was delirious for an hour or two; this happened three or four times. After nine days the fever abated, and he began to mend; but his hand and arm were spotted like a snake, and continued so all summer. In the autumn his arm swelled, gathered and burst; and then away went the poison, spots and all.

The most surprising and tormenting were his dreams; for in all sicknesses before if he could but sleep and dream he was happy, being ever in some pleasant scenes of heaven and earth and air. But now, on the contrary, if he slept he was sure to dream of horrid places, and on earth only; and very often rolling amongst old rocks; sometimes he was a white hawk cut into pieces; and frequently his feet would grow into two hickories. To find his sleeping hours so disturbed by the operation of the horrid poison, cast, as it were, a damp sheet over his waking thoughts.—J. BRIENTAL, *Lon. Philosophical Transactions*, vol. ix, p. 229.

16*a*. *Principally topical effects.*—CHARLES S—, bitten about 6 p.m., July 29th, 1869, by a rattlesnake two feet long, and having four rattles, on the right forefinger; both fangs passed through the skin just behind the metacarpo-phalangeal articulation. Whiskey was administered but

he vomited it and rapidly grew very ill. When seen about four hours afterwards, although a handkerchief had been tied round the arm below the shoulder, the swelling had extended beyond that part and affected a portion of the trunk. He thought he was dying, and was in a terrible state of nervous agitation, and suffering most intense pain in the entire arm, which was also swollen to more than twice its natural size, and of a livid spotted color. The respiration was quick and laborious; the pulse weak and 115; and the surface was covered with a cold sweat. A dose of *aqua ammon.* was administered, but he vomited it; he could indeed retain nothing in his stomach, and was growing rapidly worse. *Aqua ammon.* ʒj was now injected pure into the wound, deeply into the subcutaneous tissue. He at once cried loudly with the pain, but an injection was repeated of *aqua ammon.* ʒj and water ʒj into a point near the wound. After the stinging had subsided he said he felt better and thought he could sleep. The bandage was removed, and half a pint of whiskey administered; this he retained, and soon exhibited symptoms of intoxication. He made a rapid recovery, without reactive inflammation.—G. F. JENKINS, M.D., Sandusky, Iowa, *Med. and Surg. Reporter*, xxii, 458, 1870.

16 *b. Peculiar local effects.*—Mr. R—, aged 48, of vigorous constitution, was bitten, July 10th, by a small black rattlesnake, on the second joint of the left ring finger. Within half an hour he drank a pint and a half of brandy; this produced only slight intoxication, though he was previously very little used to alcohol, and it passed off within a few hours. July 11th.—The hand and arm up to the shoulder were greatly swollen, otherwise he appeared not much affected. He continued much the same for 4 days, with the addition of some cerebral pain and malaise. July 14th.—He complained of a feeling of soreness in the flesh of the right hip, and on examination a jet black spot, some two inches in diameter, was discovered, having an elevation or thickening of the skin to the extent of about a line, and having well-defined edges. During the next four days this discoloration extended up to the level of the umbilicus, completely round the body and down to the extremities. During convalescence it disappeared gradually from above downwards, leaving the toes last. With this strange discoloration, which was at all times jet black and solid (not spotted as is sometimes the case in these toxæmiæ), came on a great prostration, and death-like sickness, so great that syncope would occur on assuming the upright position. Result, recovery apparently without reactive inflammation.—J. S. RICHARDSON, M.D. Harper, Iowa. *Philad. Med. Times*, i, 306, March 10th, 1879.

17. *A moderately severe case, badly reported.*—A MAN (in 1786) bitten on inside of foot, about middle of hollow. Shortly afterwards the head and face were prodigiously swollen, and the latter black; his tongue was proportionately enlarged, and protruded out of the mouth. His eyes were as if shooting from their sockets. His senses were gone, and there was every appearance of immediate suffocation.—J. MILLER, in *New York Medical Repository*, vol. ii, p. 242.

18. *Principally topical effects.*—MR. LOBDELL, bitten on right hand in triangular fleshy part between thumb and forefinger, both fangs entering.

When seen three hours and a half after the accident, the hand was much swollen, and the swelling extended nearly to the elbow. The hand and lower part of the forearm were dark and mottled; he had vomited several times. His voice had become indistinct, and his pulse was 116. The swelling and discoloration extended very rapidly, and nearly reached the shoulder within five hours. L. S. HAIN, in *Buffalo Medical and Surgical Journal*, vol. i, p. 82, 1861.

19. *Principally topical effects.*—A MAN.—Bitten on hand. Swelling commenced within a few minutes, with severe pain and nausea. Within half an hour the whole arm to the shoulder was swollen to twice its normal size. The skin of the whole arm became of a deep orange colour within half an hour. The whole side of his body soon became affected in the same manner.—JAMES THACHER, M.D., *Boston Medical Intelligencer*, vol. i, p. 62, 1823.

20. *Recurrent effects*—SCHŒPF—Annually at the same time of the year pains, swelling and fever, with blue and yellow spots on body. After a bite. SCHŒPF, CARPER, S. 3313. HERING.

21. *Suppuration.*—A YOUNG MAN, aged 24, tall, muscular, and of bilious temperament. Bitten on middle toe of right foot. Dr. Wilson reports: "In a short time the foot was much swollen and very painful, but as the distance to town was eight miles he delayed sending for me until next morning. I found the foot and lower portion of leg so much swollen as to rupture the skin from the toe to the ankle: the parts were quite black. He said he did not feel so badly as his foot looked; but that he had been vomiting severely. Had lachesis 12, and had carbonic acid applied, and he was nearly well next day, though suppuration followed.—W. WILSON, M.D., Chariton, Iowa, in *American Homœopathic Observer*, 1872, p. 73.

22. *Suppuration.*—DANIEL STEEL, bitten below and on the metacarpal joint of left index finger about 4 p.m. Sept. 13th, 1835.

Blood flowed immediately from both fang punctures, and the parts in the immediate vicinity became tumid and livid, notwithstanding his efforts at suction with the mouth, which, however, faintness obliged him soon to relinquish. Within the first half hour he fainted several times, and became very pale, and the whole back of the hand had become puffy and tumid with effused blood in the cellular tissue, and the forearm had begun to swell. The flow of blood continued profuse, the blood appearing to have no disposition to coagulate. The faintness was extreme. After five hours, the hæmorrhage continuing extensive, he appeared to be dying. The tumefaction had extended up to the arm, the inner and inferior portions of which were discolored by the effused blood. He vomited incessantly, and complained of insatiable thirst, drinking cold water every few minutes. He had pain and stricture at the lower part of the chest or pit of the stomach; great restlessness and anxiety; cold skin, except on the wounded arm; the arm was very painful. In addition there existed delirium, singultus, and difficult breathing. The pulse was scarcely perceptible. The back of the hand was blackish and more swollen, and the skin of the forearm hot and tense. The hæmorrhage appeared to be endangering life. By next morning the pulse was improved; the thirst and

irritability of the stomach were allayed, and reaction appeared to have set in ; but the tumefaction had extended to the shoulder, with blue-black streaks up to the axilla, and there still existed constriction of the chest and great local pain. The swelling of the hand and the hæmorrhage were diminished. These symptoms gradually subsided during the day ; but still he had a tendency to sinking, and the system appeared to have to struggle with the poison. On the third day reaction appeared to be more established ; but, notwithstanding careful nursing, suppuration supervened, and the patient was unable to leave his bed for about a week.—*Lon. Lancet*, 1835-6, vol. ii, p. 574 ; also HARLAN's *Med. and Phys. Researches*, Philadelphia, 1835, p. 490, and *Amer. Journ. Med. Science*, viii, 397, 1831.

23. *Suppuration, sloughing, and necrosis.*—S. W. WOODHOUSE, M.D. Bitten in the side of the index-finger of left hand about middle of first phalanx in the morning of September 17th, 1851.

Pain was intense, and immediately produced a sickening sensation. Within half an hour the glands in the axilla were becoming sore and painful. He shortly vomited freely ; in the evening the glands in the axilla were quite painful, and so was the finger. During the ensuing night he was restless and sleepless notwithstanding gr. iv *Pulv. Opii*. The next morning, that of the second day, the pain in the finger was intense : a well-marked line of inflammation extended along the arm to the axilla ; and several times on attempting to walk a few yards he was seized with nausea and vomiting. This condition continued for several days. The pain was relieved by resting the arm on an inclined plane. During the second night, under the influence of *Pulv. Doveri*, he slept ; but next morning, that of the third day, the hand and arm and glands in the axilla were much swollen and very painful. During the third night, under the influence of *Pulv. Doveri*, he rested, but the back was becoming very sore ; and in the morning, that of the fourth day, the pain was very great, and the swelling extended down the side to the hip : the blistered skin of the finger being removed, there was a free discharge of watery sanguineous fluid, without smell. The nail was becoming loose, and the broad red line following the course of the lymphatics was filled with yellow serum ; and the point where the fang had entered, for the space of about three eighths of an inch, was of a dark brown colour. During the fourth night he was very restless and sleepless notwithstanding gr. x *Pulv. Doveri*, the hand being filled with serum. He continued much the same during the fifth day. On the sixth day the swelling had left the side and arm, but remained a little in the hand ; and he could walk a few yards without nausea, and was able to sit up most of the day. On the seventh day he felt much better, and only the finger remained swollen, the first and second joints of which looked unhealthy and appeared gangrenous on the palmar surface : the discharge was thin and watery, but without smell. The granulations were rough, and many of them appeared as if they had been sprinkled with yellow ochre : the nail was quite loose. After this the nail was removed : a large slough formed, and on coming away left the bone exposed : this afterwards exfoliated, and had to be removed. After three months the finger was healed, but left deformed,

and its circulation imperfect.—*Account of Sidgreave's Expedition down the Zûni River*, S. W. WOODHOUSE, M.D., Surgeon and Naturalist to the Expedition.

24. *Suppuration and boils.*—Mr. BELCHER, an exhibitor of rattlesnakes at Saratoga, was bitten on little finger, the fang being deeply inserted. Pain and swelling followed immediately. L. S. Whiting writes: "When seen, forty hours after the bite, the finger was enormously swollen, and the hand also for about halfway to the wrist. I immediately gave him brandy, neat, about one-third of a good-sized tumblerful every half hour. I made deep incisions on each side of the finger, and had the finger, hand and arm wrapped in cloths wet in brandy and salt. After ten hours, the pain being very severe, I applied stramonium poultices to the finger and hand, which were discharging freely from the incisions a bloody water. The swelling continued slowly to extend: I exchanged the brandy for whiskey, and continued the clothes wet in the liquor and salt. The second day, his stomach being irritable, I stopped the whiskey a few hours and gave quarter-grain doses of acetate of morphia; applied cold cloths to the stomach, and gave weak broth. The swelling continuing to increase I again commenced the whiskey, but in small quantities. I continued this treatment for three days, before the swelling, which had extended to above the elbow, was entirely arrested; giving about one grain of morphia every twenty-four hours. On the fifth day the finger began to suppurate: I opened it next day, and it continued to discharge freely for several days. Boils came out on the arm as far as the swelling had extended; in all about eighty at one time. His convalescence from this time was rapid, and he recovered perfectly, except the use of the little finger. He drank, during the first four days, seven quarts of brandy and whiskey; with very slight symptoms of inebriation."—L. E. WHITING, *Boston Medical and Surgical Journal*, vol. l, p. 258; also *Saratoga Press*, April 17, 1854.

25. *Recurrent eruption, every three months.*—MARY O—. Dr. PIFFARD writes [in 1875]: "On March 29th, 1866, I was called to see Mary O—. When about to examine her pulse I observed that the tendons of the *flexor carpi radialis* of the right hand were quite tense, and the hand somewhat drawn up. And in addition to this I observed an eruption of small vesicles upon the integument between the metacarpal bone of the thumb and index finger. The vesicles were four in number and about the size of a No. 1 buckshot and filled with a slightly yellowish fluid, and were situated on a somewhat reddened but not raised base. Upon inquiry I obtained the following history: Six years previously she was bitten by a rattlesnake, its fangs entering both the palmar and dorsal surface of the proximal phalanx of the right thumb. The bite was followed by severe pain and great swelling of the hand, forearm, and arm, nearly to the shoulder, accompanied with discoloration of the integument. In addition there was marked contraction of some of the flexors of the hand; and also nausea. From this accident she appeared to have recovered. Three months later, however, there appeared upon the integument covering the metacarpal bone of the right thumb an eruption of three or four small vesicles,

accompanied with 'bite' pain at the site of the eruption, together with contraction of the flexors and inability to extend the hand. In the course of a few days the vesicles dried up and the other symptoms disappeared. Since that time, and up to the date of my visiting her, she had had a return of the eruption with contraction of some of the flexors EVERY THREE MONTHS. April 7th, the vesicles have disappeared; leaving only small reddish spots, which mark their site, and the flexor contraction has subsided.

June 30th.—Her husband called to inform me that the eruption had returned two days ago. I found it was so, just as on March 29th.

October 1st.—To-day she showed me the vesicles again. They had appeared some days before, and were now on the decline; in fact, nearly dried up. The flexor tension was slight, but distinct.

On several occasions, I have seen a repetition of the phenomena described above, occurring with the same periodical regularity.

For several years I lost sight of the patient; but met her again a year ago, and she then informed me that for some three or four years the vesicles did not return with their previous regularity, but at indefinite intervals, always now more than three months intervening between the attacks; and that during the last seven or eight years there had been no return of the vesicles."—HENRY G. PIFFARD, M.D., in *American Medical Recorder*, New York, No. 220, p. 62, January 23rd, 1875.

25 *a*. MISS CASTEEL, aged 18. Bitten on anterior aspect of right leg just above ankle, by a medium-sized rattlesnake, both fangs entering, and the snake not able to disentangle itself until after having been dragged several yards.

Being the end of July, 1850, the weather was very hot. I saw the patient three hours after the accident, and found the foot and leg much swollen and the patient suffering extreme nausea, vomiting frequently, covered with cold perspiration and shivering like one in the cold stage of an intermittent. The countenance was anxious, the breathing hurried, pulse frequent and feeble, and an involuntary evacuation of urine every few minutes.

As soon as practicable hot brandy toddy was administered, and repeated frequently in large quantities, and continued until reaction was evidenced by an increased volume of the pulse, and a general glow of warmth over the whole surface.

The nausea and vomiting subsided soon after beginning the brandy, and in a short time the countenance resumed its natural appearance.

A cord had been tied round the leg above the bite, but the swelling continued to increase, and had reached half way up the thigh; the cord was therefore removed and a bandage applied from the toes to the hip, and this was kept saturated with ammonia liniment, whilst a sponge saturated with spirits of ammonia was kept applied to the bitten part; these applications were continued for three days. The brandy was discontinued soon after reaction was established; after this, slight febrile action set in, but it was readily controlled by a few doses of calomel and Dover's powder, with castor oil sufficient to operate mildly once or twice a day for three or four days. The part sloughed, though not

extensively. The swelling had nearly subsided by the eighth day, and the bandage was removed on the ninth. No further treatment was required, and the patient soon recovered her usual health.—JOHN S. JONES, M.D., Harrison, Tenn. *The Southern Journal of Med. and Surg. Sciences*, 1855, vol. vi, p. 376.

26. *Death within about* 18 *hours.*—ADAM LAKE, aged 40, a robust muscular man. July 1st, 1831, was bitten, during the day, in the bend of the elbow, both fangs entering. Being intoxicated he forgot this, but some hours afterwards—in the evening—he felt an itching at the place, and on examination he found "a red spot" there. Shortly after this the whole arm swelled to nearly double its size and became very painful. The next morning, about 8.30, he vomited in the conveyance in which he was being driven. The scarifications made near the bite the previous evening were still bleeding freely. The arm, from the shoulder and front of thorax to the fingers, was swollen to twice its natural size, and very painful on movement. The pulse was almost imperceptible and threadlike; his extremities were cold; he was depressed, restless, and uneasy; had cramp in the legs, and his debility was very great: his eyes were muddy and heavy, and face somewhat bloated. Feeling a desire to go to stool he was assisted from his bed for that purpose; whilst on the way he was seized with general spasm without foaming at the mouth; being laid on the floor it went off in a few minutes, and he had an involuntary evacuation from the bowels, of a dark bilious colour. The symptoms continued stationary until 11.30 a.m., he then complained of violent pain in the course of the colon; said he felt sleepy; closed his eyes; and in a few minutes died, without agony or convulsions, that is, in less than 24 hours after the bite.

P.M. July 2nd.—Four hours after death. The face was much bloated; neck tumid and purple. The bitten arm much swollen from serum effused into cellular tissue, and purplish and mottled. Much fluid blood followed on cutting into the scalp, and still more from the sinuses of the brain, perhaps nearly a pint. The arachnoid covering the hemispheres was raised into vesicles by the deposit of serum beneath, giving it the appearance of a blister. The veins of the pia mater were much injected. The brain substance was much congested; and the cortical substance of a deep brown colour. Much serum issued from every cut made into the brain. The cerebellum also was congested. There was no extravasation of blood. There was very little blood in the heart, perhaps having run out from its fluidity. No ecchymoses in the stomach. The mucous coat of small intestines exhibited patches of acute inflammation throughout the whole length, of a lively red colour, and of various diameters, from six to twelve or eighteen lines, and very close in succession, especially in the jejunum. The liver was somewhat yellow. (Was this at all a result of his drinking habits?) The muscles were brownish, instead of red. The bitten limb was tumefied from effusion of serum in cellular tissue. The blood was universally fluid.—W. HORNER, *American Journal of Medical Sciences*, vol. viii, p. 397, 1831, also *N. Am. Med. Chir. Rev.*, v, 286, 1861.

27. *An acute, rapid case, nearly dead within ten minutes; dead within*

fifteen minutes.—FEMALE CHILD, aged 2 years; bitten on left cheek. The wound was immediately sucked by the child's mother. Within ten minutes Dr. Renzger found the child almost expiring: the countenance was deadly pale; eyes half open and staring; the mouth covered with foam; the extremities cold and insensible; pulsations of heart irregular, pulse trembling and scarcely perceptible; respiration slow and laborious. The body was perfectly motionless; and covered with a cold viscous sweat; eyes and ears appeared to be insensible to impressions. After three or four minutes more the face was slightly convulsed; and after a few deep stertorous respirations the child died, that is, within fifteen minutes after being bitten. The circumference of the wound was red and somewhat œdematous, perhaps from the suction.

P. M.—At the post mortem, three hours after death, the brain was found healthy, but its sinuses and pia mater were filled with blood; as were also the lungs, the venæ cavæ, the right cavities of the heart, and the pulmonary artery.—Dr. RENZGER; *Lancet*, 1829-30, vol. ii, p. 90; from *Meckel's Archives.*

28. *A severe case, death within nine hours.*—Mr. DRAKE, an Englishman, bitten twice in left hand: near root of thumb, and in the palm; at 11.30 a.m., Feb. 9th, 1841, at Rouen. Within a few minutes he became very agitated, anxious and pale, and a cold sweat bathed his face and chest, and his eyes expressed anxiety. Within four minutes after the bite a ligature was tied tightly round the wrist; and in about eighteen minutes the fang punctures were cauterized with a red hot needle. The hand becoming swollen, very painful and of a violet colour, the ligature was removed shortly after the cauterization. About twenty-five minutes after the bite there was sudden paleness or the face. Drake went to sit down, but he fell over. There was general relaxation of the muscles, and total loss of movement and of power; his head hung upon his chest. There was stertorous breathing, syncope, and involuntary evacuation of urine and fæces; with cold extremities. About twelve o'clock I had the patient carried into his room. The pulse was scarcely perceptible. Respiration still noisy. Eyes closed, and pupils contracted. The conjunctiva was not yellow at all, as has been described as the case after the bite of rattlesnakes. In spite of his very weak condition, he made painful efforts to aid those who were trying to take off his clothes. He was placed in bed. His pulse became perceptible again; it was weak and only beating fifty times in the minute.

The skin of the extremities was cold; that of the abdomen, trunk and head much less so. The lower extremities seemed insensible—strong pressure or pinching up of the skin excited no expression of pain. There was no tumefaction of the wounded hand, nor any congestion of the arm. The state of torpor continued until 12.30. He complained of feeling cold, and vomited for the first time, with marked relief. At 1 o'clock he vomited again, and the ejecta were yellowish-green and fetid. The hand was slightly swollen round the wounds, and the patient said it was painful. There were three stools—one at 12, another at 12.30, and a third at 2. He was remarkably calm up to 2 o'clock, when there was renewed vomiting. At 3 o'clock he felt better—his

mind was calm and self possessed, and he had hope of recovery, but he was readily annoyed by the least noise. His pulse was 80, firm, but irregular. Though right handed, whenever he attempted to drink or take anything it was with (the left) the wounded hand, and he complained that he could not use the right arm with freedom. At 4 o'clock his respiration became difficult, and he had trouble in swallowing liquids; he could drink, but only a little at a time. The pulse became accelerated to from 90 to 100 in the minute. The vomitings were less frequent. At 5 o'clock he complained of pain in the left shoulder. The upper lip was evidently swollen. The tongue was yellowish, but not at all swollen. By six o'clock there was acute pain in the shoulder, but without any appearance of inflammation. At 7 o'clock the face was drawn, voice very weak, tongue with a white fur; and there was considerable oppression and great anxiety, and he begged to be bled; his pulse was 110. Drinks had to be given in a spoon, and he kept them in his mouth a long time, and only after a painful effort could he swallow them; and he often objected altogether to take them; and said his blood was suffocating him. Three leeches were applied to the bend of the neck, and he said he was less oppressed afterwards. At 7.30, the breathing became stertorous; the upper lip was still swollen; the neck was bent, the head hanging slightly towards the right shoulder; the body lying on the back, the limbs flexed. Much agitation; efforts to get out of bed, as he believed he could then breathe more easily. By eight o'clock the extremities were cold; pulse imperceptible; total incapacity for swallowing. His mental faculties were unaffected, and he had no incoherent ideas, even while the most alarming symptoms were present. He took notice of all that was going on around him. While enduring the very agonies of death, he even paid attention to noises in the street. The noise of the Diligence starting for Paris recalled memories of home. "Is that Martin going off"? [Martin was the conductor.] "No," said the interpreter. "I am very sorry, as he would bring my wife; for I believe I shall never see her again. . . . . I feel very bad." Some minutes afterwards there was sudden extension of the lower extremities. He sat up, and tried, in vain, to get out of bed. His respiration became more and more embarrassed. His head was thrown back. The rattling in the throat increased. The patient expired at a quarter past 8, that is, within nine hours after the accident.

P.M.—Drake died at 8.15 in the evening of the 9th of February; was interred on the 10th. An order by the mayor of the town of Rouen, dated the 12th, was requested by Drs. Pihorel and Desmoulins, and by it permission was obtained for his exhumation. The post-mortem was made at 1 o'clock in the presence of several other physicians; below is the result thereof:

The exterior of the body, with the exception of the places where the two cauterizations were performed, did not differ in any respect from the post-mortem condition of a healthy person who had died of syncope. The preservation of the body was the same as that of one twenty-four hours after death, thanks to the season of the year. The semi-transparent condition of the cornea allowed the pupil to show

through, and showed the dilatation which it had assumed immediately after death; that is to say, its diameter was twice that of the iris itself. The state of the corpse itself was such that the autopsy was just as valuable as if it had been made immediately after death.

There was no swelling of the bitten hand; no coloration of the rest of the limb, of the lips or tongue. The marks which had been made by the application of the leeches to the neck, were not ecchymosed out of the common. The skin of all dependent parts was slightly œdematous and swollen from gravitation of blood; the ordinary result of gravity in any body when death has been due to hæmorrhage or blood-poisoning.

In the brain and spinal cord the only alteration was a little injection, of such a kind that the section was just a little spotted with blood; but the cerebral arachnoid was notably thicker and more tough than normally, and was too opaque; moreover, it adhered to the pia-mater, the meshes of which were distended with viscid serum.

The membranous covering of the spinal cord, also, was more injected than in health. The basilar arteries contained some small clots like those we shall consider further on. The blood was liquid in the cerebral sinuses, and in the vessels of the dura mater.

The skin was examined carefully at each of the two bites, and presented no other alteration than that caused by the cauterization with the red-hot iron. This alteration was little more than a line of redness. The subjacent cellular tissue of the wound on the dorsal surface of the thumb was in no way infiltrated; but it was for the extent of a circle of half-an-inch diameter round the second mark, that situated at the upper part of the interosseous space, between the first and second metacarpal bones. The muscles surrounding this infiltrated area did not present the least alteration in texture or color.

All the veins of the back of the hand, and their tributary vessels were dissected up to the axilla, and did not present any alteration; they resembled perfectly in all respects the corresponding veins of the other arm. They contained no blood below the elbow; from the elbow as far as the axilla they contained disseminated clots. In the clavicular extremity of each axillary vein commenced a clot, moulded to the interior of the vessel, and reaching as far as the junction of the hepatic vein with the vena cava inferior, passing by the right auricle of the heart; this clot was homegeneous throughout and of only slight consistence, and nowhere was there any evidence of deposited fibrin; a large clot also filled the left auricle of the heart spreading into the pulmonary veins, but in the centre of this clot there was a band of yellowish fibrin, sixteen or eighteen lines in length, and such as is commonly found in venous clots.

The completely empty condition of the two cardiac ventricles contrasted with the distension of the auricles, more especially of the right.

The mucous membrane of the wind-pipe and of the bronchi was notably injected. A patch corresponding with the cricoid cartilage was, indeed, inflamed. The trachea and bronchi were filled with reddish frothy serum. The lungs throughout were healthy and crepitant, but presented the first stage of sanguineous engorgement.

The blood did not flow from a cut made anywhere. Two inches below the pharynx the œsophagus was narrowed for about half an inch, but without any evident alteration of texture.

The stomach, intestines, liver and gall-bladder were quite normal.—Mons. Pehorél, *Journ. de Phys. Exp. et Pathol.*, viii, 97; also *Lon. Med. Gaz.*, vol. xxix, 1841-2, p. 487.

29. *A severe case; death within twelve hours.*—Masianno José Machado—A white man, about fifty years of age, of ordinary stature, stout, and of sanguine-bilious temperament, and who had suffered over six years with leprosy (Elephantiasis leontina) worst in the face—voluntarily submitted himself to be bitten by a rattlesnake in hope to cure the leprosy.

He was bitten betwen the articulations of the ring and little fingers with the metacarpus at about 50 minutes after 11 o'clock in the morning of the 4th of September, 1838, in Rio-de-Janeiro. He felt no pain with the bite, nor any effects from the poison introduced into the wound; he only knew that he was bitten when it was announced by the bystanders. His hand was immediately withdrawn from the cage; it swelled slightly, and a few drops of blood escaped from the wound, but he felt no pain; he continued perfectly tranquil; respiration natural and pulse regular. Five minutes after the bite a slight sensation of cold was felt in the hand. At 12 noon there was slight pain in the palm of the hand; this increased after some minutes. At 12.17 the pain extended to the wrist; at 12.20 the hand was considerably swollen; at 12.30 the pulse had become fuller. All this time the patient conversed in a lively manner, and even laughed. At 12.50 there was a sensation of fulness in the course of the jugulars; some alteration in the vision; and some formication in the skin of the face. At 12.55 the sensation of fulness had extended to the sides and back part of the neck; the hand continued to increase in volume, and the pain extended two-thirds up the forearm. At 12.59 there was numbness over the whole body. At 1.20 p.m. there was tremor of the whole frame, and sensibility to touch. At 1.36 there was some cerebral disturbance; the pulse was more frequent; there was some difficulty in the movement of the lips, somnolency, sensation of constriction in the throat; the pain was more intense, and extended over the whole arm; and increase in tumescence of the hand. At 1.38 he felt cold and covered himself. At 1.48 there was pain in the tongue and fauces, extending down to the stomach; increased pain and swelling in the hand; and coldness of the feet. At 2.5 there was difficulty of speech. At 2.25 difficult deglutition, anguish, and copious perspiration on the chest. At 2.50 the arms were powerless; there were some drops of blood from the nose; and increased anguish and inquietude; pulse 96. At 3.5 general swelling; involuntary groans, and sensation of sinking. At 3.8 great pain in the arms, and restlessness. 3.30 pulse 98, face flushed, continued bleeding from the nose. 3.35 drank a little wine and water without difficulty; his shirt was changed, wet with perspiration; there was intense redness of the whole body; some drops of blood escaped from a pustule under the arm. 3.40, pulse 100; redness of the surface more intense, and of a darker hue, especially in

the bitten limb; violent pain in the superior extremities preventing any rest, notwithstanding the exhaustion of which he complained; constriction of the throat, and breathing embarrassed; the inferior extremities did not yet exhibit any particular phenomena. 4.50 pulse 124; great heat over the whole surface of the body; salivation. 5.30. Torpor; pulse in same state. The urine all along has flowed in great abundance; saliva viscid, of dark colour, and expectorated with difficulty; increase of muscular prostration; frequent groans, excited by pains over the whole body; respiration tranquil; pulse full; skin soft; increased tumefaction of bitten hand. He continued in this state until 7 p.m., when he had some disturbed sleep, with groans; after this he awoke and said he was free from pain in the arms, but had great pain in the chest, and a feeling as of a knot in the throat; urine copious; deglutition very difficult; saliva viscid and white; sanguinolent fluid running from the nostrils; could not drink some sweetened rum and water offered to him. 8.0. The sweating has ceased, and the groaning is not so constant. 8.30. Passed urine. 9.10. Passed urine; ceased to groan. 9.15. Profound sleep. 10.0. Offered the infusion of guaco, three tablespoonfuls with one of *Eau de luce*, which he refused, but he took the simple infusion; the sanguinolent secretion from the nose stopped; pulse regular; diminution of the tubercular elevation of both arms and face, which presented the appearance of erysipelatous redness. 10.20. Passed about 2 oz. of tolerably perfect urine; he remains more tranquil, and sleeps at intervals without groaning. 10.40. The pain in the chest is much diminished; he has now pain in the legs and feet, in which, until this time, there had been a sensation of deathlike coldness; pulse 108, regular; thirst, and he drinks without difficulty. 11. Took four tablespoonfuls of infusion of guaco. 11.45. Emission of urine, high coloured; drinks water easily, by spoonfuls; pulse 119; the wounded hand and arm are inflamed and very painful; restlessness. 12.0—midnight—has slept soundly, only interrupted by eructions; pulse 112; passed urine. 12.30. Very restless; he cries distressingly and calls for religious consolation; refuses medicine. 12.40. Passed urine; pulse 116; sensation of great heat in the legs, and desires the coverlets to be removed. 1.0. Takes his medicine again; asks to be uncovered; passes urine; becomes very quiet. 1.15. Passes urine; pulse 100. 1.40. Takes a dose of infusion of guaco. 2.0. Sits up in his bed, and drinks three tablespoonfuls of water, but every time he drinks, the pain and restlessness increase. 2.10. Passes urine. 2.20. Takes his medicine; has become more tranquil. 3.0. Passes urine, the lower lip, which had been much swollen and inflamed, returns to its natural state; the salivation ceases. 3.55. Passes urine, the quantity always from two to three ounces; is more tranquil; takes his medicine; pulse 110; involuntary movements of the right thumb and left leg. 4.0. Passes urine. 4.45. Takes a spoonful of medicine; pulse 100; quite tranquil and sits up. 5.0. Passes urine; declares himself in great agony. 6.0. Pulse 100; respiration free; frequent groans. 6.10. Passes urine. 9.15. Great prostration; convulsive movements of lower jaw, and lower extremities; urine bloody. 10.0. Pulse accelerated and intermitting increase of the convulsions;

diminution of the redness of the skin and the swelling of the limbs; deglutition extremely difficult; respiration anxious. Blister applied to thighs and a spoonful of infusion of guaco given. 10.50. Convulsions diminished; ammonia and brandy given. 10.55. Cessation of convulsions. 11.0 remains in same state; swallows with difficulty. 11.30. Expired, that is, within twelve hours after the bite.

In a few hours the corpse became livid and much swollen. At 10.0 the following morning, 10½ hours after death, the body was enormously swollen and covered with red and livid spots, and exhaling a fetor so insufferable as to preclude the possibility of an autopsy as was desired and intended.—R. WHITMIRE CLARKE, Surgeon, R.N., *Lancet*, 1838-9, vol. 1. p. 443; also MAÏA and REIS; *Medical Gazette of Paris*, Jan. 5th, 1839; also MURE's *Materia Medica*, p. 6; also *N. A. Med.-Chir. Rev.*, v, 285, 1861; and *B. J. H.*, xxiii, 682.

30. *A severe case; death within six hours.*—Dr. WAINWRIGHT, a large and well-built man, 40 years of age, was bitten in the last phalanx of the middle finger of the left hand, near its articulation with the metacarpal bone, about 6.30 p.m. At the time the wound was made, the bystanders observed that it was immediately followed by a small jet of blood. It was immediately sucked, and within half an hour an attempt was made to incise the part, and the incised surface was cauterised. From the nature of the part involved in the wound the incisions must have been imperfect. A ligature was also tied firmly round the wrist, and ten grains of carbonate of ammonia and half a grain of acetate of morphia were administered. About 7.30 the ligature was removed. Previous to the removal of the ligature the hand had been very much swollen, but no swelling had occurred above the ligature; it now, however, began to extend up the arm. At 9.30 the patient was seen by Dr. Post, and soon afterwards by Dr. Parker. The swelling had now extended to about half way between the elbow and the shoulder-joints; it was very considerable, hard, and terminated abruptly. The hand was of a dark greenish-yellow colour: the discoloration did not extend as far as the swelling, but seemed to follow it at half an hour's interval. At the time Dr. Post first saw the patient, that is, about three hours after the accident, his pulse was of medium fulness and strength; his face was flushed, and his manner excited: half an hour afterwards the pulse began to flag, and it became less full and forcible, and increasing in frequency to 100. It afterwards reached 120: this was its maximum frequency, and it became constantly more and more feeble. By 11.0 the pulse was extinct at the wrist, but still to be felt in the groin. Between 10 and 11 he became stupid, and took no notice of what was passing around him: this lapsed into complete coma, and he died a little past 12 o'clock, that is, about five and a half hours after the accident. By this time the swelling had extended under the pectoral muscle, and the discoloration had reached the axilla. It is somewhat remarkable that after the pulse had ceased at the wrist and the surface had become covered with a cold perspiration a sinapism applied to the epigastrium produced full redness after twenty minutes. The treatment, after Dr. Post saw the case, consisted in the administration of stimulants (brandy and carbonate of

ammonia); and when they could no longer be given by the mouth they were administered by the rectum.—Dr. Post, in *Boston Medical and Surgical Journal*, vol. xxxviii, p. 65, from *Analyst*.

30 *a. A severe case.*—Eddie Jeffries, aged 6 years, bitten by a rattlesnake on the dorsal surface of the right hand, on the 31st of August, 1878, at 9 a.m. After fifteen minutes whisky was administered to the extent of intoxication, and to the wound was applied bicarbonate of soda saturated with brandy, but this was soon replaced by strong solution of ammonia. Above the elbow a bandage was applied, but too loosely to be of use.

I did not see the child until three hours after the bite, viz. at noon. The punctures were then plainly visible, corresponding to the two fangs in the upper jaw and to the principal teeth in the lower jaw. The immediate vicinity of the bite was not swollen, gangrene having been immediately produced, but the hand and the forearm for four inches above the wrist were very œdematous, and of a livid colour and shining: the swelling of the hand was so great that the fingers were semiflexed and separated. The child was delirious; his hearing was dull; his eyes closed—upper lids and superior recti being paralysed; the pupils were slightly dilated, and insensible to light; vision apparently lost. The eyes looked straight forwards; but when the lids were forcibly opened the eyes were directed outwards to escape the light, not, as usually, upwards. The countenance expressed calm indifference with marked prostration and apparent freedom from suffering: the lips and cheeks were of their normal colour. There was no pulse at the wrist, but auscultation showed the heart to be beating about 100 per minute, with feeble impulse, and remarkable shortness of the systo-diastolic interval. The respirations were rapid, thirty per minute. The skin of the extremities was dry and cool, but not cold. The temperature, taken with difficulty, in the left axilla was 96·4° F. The patient had repeated attacks of sickness, vomiting at first portions of undigested food mixed with a greenish fluid, then of thick viscid mucus like white of egg slightly stained yellow.

Immediately on my arrival I tightened the bandage so as to effectually occlude the vessels of the arm. Shortly after this there was one copious emission of urine, and afterwards the child only passed small quantities of very pale urine. At the same time a watery diarrhœa set in, with colic and tenesmus. At 1 o'clock thirst was excessive, and was freely indulged; at this time also the swelling had reached the bandage, and seemed to be arrested there, though well-marked livid lines followed the course of the superficial vessels above the bandage, pointing to the probable disintegration of these vessels and extravasation of blood. From 12 to 3 o'clock there were great restlessness and some twitching, alternating with periods of complete repose. In his delirium he uttered plaintive and feeble moans. There was paralysis of both upper extremities, particularly below the elbows; and, to a less degree, of the lower limbs also. The child made repeated ineffectual attempts to stand up, but as soon as he got on his elbows and knees, or into the kneeling position, he fell back helplessly on his side.

As three hours had elapsed cauterisation was useless; I therefore made a hypodermic injection of aqua ammonia (½), and administered internally Sp. Amm. Arom. with half an ounce of brandy, and ordered fresh milk for food, half an ounce (pint? J. W. H.) every hour.

Under this treatment reaction set in, the pulse reappeared at the wrist on the wounded side, and the vomitings ceased. At 3 o'clock the patient expressed himself as feeling better, and now for the first time after my arrival he complained of pain in his head.

I revisited him at 8 o'clock in the evening, and found the arm more swollen, and that blisters had been formed on various points on the injured limb, and that the skin had burst in the bend of the elbow, and a small quantity of extravasated blood was visible. The nervous power had, however, recovered to a remarkable extent; the agitation and jactitation had entirely disappeared, and the sense of taste had become as good as ever; hearing and even vision had become normal, and the intelligence was completely restored, though there was still some tendency to drowsiness. The respirations, however, still continued 30 per minute, and the pulse had again almost disappeared at the wrist, remaining about 100 per minute. The temperature was now 97.1° F. in left axilla. The child complained of great pain in the chest; and, the mother informed me, had, during my absence, had two convulsions, not severe ones. At 4 o'clock, in violation of my orders, the mother had loosened the bandage, because, as she alleged, his arm pained him so much. This had allowed an additional increment of the virus to enter the circulation, which might account for the relapse.

At half-past 9 I again left him, and at my visit next morning I learned that the lad had died at half-past 2 o'clock in the morning, September 1st, that is, twenty-nine hours after the bite.

Death must have resulted from syncope, for the family said he went off very suddenly, "all at once," when they were least expecting it.

A post-mortem was refused, but the child's face was of a light saffron colour, and the ears, the hand, and the right arm were livid.—A. Irans Comfort, M.D., Kanzas, *Phil. Med. Times*, November 23rd, 1878.

30 *b*.—Dr. Sladia. Bitten on the 12th , by a large rattlesnake on the right hand, between the little and ring fingers. Almost as quick as thought the hand began to swell, and before any application could be made the place of the bite had swollen to the size of a butternut, obscuring the fang marks. Within an hour he could not sit up, and so went to bed. He was bled several times during the night; lingered through the next day, and died about 7 o'clock in the evening; that is, about 24 hours after the bite.—*Boston Med. and Surg. Journ.*, xxi, 208, 1844.

31. *Convulsions and hæmorrhage*.—Spix, Jerome. Swelling round the wound and of whole body; face discolored; eyes sunk and almost extinguished; repeated faintings; tremblings and convulsions of the limbs, with rush of blood to head. Blood issued from nose, eyes and ears, and from stomach in the vomit. Dry consuming fever tortured him; tongue dry: thirst incessant: death.—C. Hering, *Symp.*, 2656.

32.—A CHILD: soon after being bitten became disfigured by yellow and dark spots on the skin. These symptoms disappeared in the winter; but at the return of the same period of the year they reappeared; the hands and feet swelled; and the child died.—McCALL, C. HERING, *S.* 3312.

33.—*Severe prolonged case.*—THOMAS SOPER, aged 26. Bitten on the back of the first phalanx of the right thumb and second joint of the forefinger at 2.30 p.m. on 17th October, 1809. The hand began to swell immediately, and within half-an-hour the swelling had extended halfway up the forearm, the part had become very painful and the skin very tense. Within an hour and a half after the bites the swelling had extended to the elbow, and within two hours it had reached halfway up the arm, and the pain had extended to the axilla. The skin was cold; pulse 100: his answers were incoherent and he complained of sickness. Alfter five hours the pulse was very feeble. After six and a half hours the skin was still cold; pulse 80, weak, and there was a feeling of great depression. After eight hours there was much complaint of pain in the arm, and fits of fainting attacked him every fifteen minutes, during these the pulse was not perceptible, but in the intervals his spirits were less depressed. During the evening he had two stools. After nine hours the hand, wrist, forearm, and arm were much swollen up to the top of the shoulder and into the axilla; the arm was quite cold and no pulse could be felt in any part, and the skin generally was unusually cold. The mind was collected. After ten hours and a half the attacks of fainting came on occasionally, and he talked indistinctly; pulse 100; the attacks of fainting came on occasionally; the medicine was repeated every hour. At 8 a.m., on the 18th, the pulse was 132 and very feeble: the swelling did not extend beyond the shoulder to the neck, but there was a fulness down the side, and blood was extravasated under the skin as low as the loins; giving to the back on the right side a mottled appearance. The whole arm and hand were cold, but painful when pressed. The skin was very tense. On the inside of the arm below the axilla and near the elbow vesications had formed; and under each of the vesicles there was a red spot in the cutis of the size of a crown-piece. The skin generally over the body had become warm. He was low and depressed; there was a tremulous motion of his lips, and the faintings recurred at nearly the same intervals as on the preceding evening. The last dose of medicine was rejected by vomiting, but some warm wine remained on his stomach: the arm was fomented. At 12 noon, in addition to the above symptoms, there was starting of the limbs. He had attempted to take some broth but his stomach did not retain it. The skin of the whole arm had a livid appearance similar to what is met with in a dead body when putrefaction has begun to take place, unlike anything I had ever seen in so large a portion of the living body. An obscure fluctuation was felt under the skin of the outside of the wrist and forearm, which induced me to make a puncture with a lancet, but only a small portion of serous fluid was discharged. At 11 p.m., finding that his stomach did not always retain the medicine nor even small quantities of brandy, I directed the volatile alkali to be left off and gr. ij of opium to be

given and repeated every four hours. At this time his pulse was scarcely perceptible at the wrist; the fainting fits were more or less frequent; and the vesications and red spots were increased in size. On October 19th, at 9 a.m., his pulse was scarcely perceptible, his extremities were cold, the vesications were larger, but the size of the arm was diminished. He was drowsy, probably from the effect of the opium. He had taken nothing but brandy during the night. At 3 p.m. he was very depressed, spoke in whispers; the vesications were larger; the vomiting fits less frequent; the arm diminished in size, and he had sensation in it down to the fingers. At 11 p.m. the pulse beat 130, and he was low: the opium was left off: a stool was procured by castor oil: he was ordered to have a glass of camphorated mixture occasionally, and wine and brandy as often as he could be induced to take them. October 20th.—He had dozed at intervals during the night; his spirits were rather better, and his extremities warm. At 9 a.m. he took coffee for breakfast: he afterwards took some fish for dinner, but it did not remain on his stomach; he took brandy and coffee at intervals, half an ounce at a time, as large quantities did not remain on his stomach. Oct. 21st.—He had slept at intervals during the night, but was occasionally delirious; pulse 120. Brandy and jelly were the only things that stayed on his stomach. The size of the arm was reduced, but the skin was extremely tender. Oct. 22nd.—He had slept during the greater part of the night; pulse 98; he took some veal for dinner, and brandy at intervals. In the evening his pulse became full and strong; he was ordered wine instead of brandy. The right side of the neck and body down to the loins was inflamed and painful, and had a very mottled appearance, from the extravasated blood in the skin. Oct. 23rd.—His pulse continued full, the arm very painful, though reduced in size: the vesications had burst, and the exposed cutis was dressed with white ointment. Stools were procured by opening medicine. He took some veal and porter for dinner; the wine was left off. In the evening he had a saline draught with antimonial wine. Oct. 24th.—No material change. Oct. 25th.—His pulse increased in frequency; in other respects he is nearly the same: bowels opened by medicine. Oct. 26th.—The arm more swelled and inflamed. Oct. 27th.—The inflammation of the arm increased; tongue furred and pulse very frequent. He attempted to sit up but the weight of the arm and the pain prevented him. The arm was bathed with spirits of wine and Aq. Ammon. Acet. in equal parts. Oct. 28th.—A slough had begun to separate on the inside of the arm below the axilla, and a purging had come on, for the latter he was ordered chalk mixture and laudanum. In the night he had a rigor. Oct. 29th.—The purging had abated; pulse 100, and feeble. A large abscess had formed on the outside of the elbow; this was opened and half a pint of brown matter was discharged, with sloughs of cellular membrane floating in it. The lower part of the arm became much smaller, but the upper part continued tense. A poultice was applied to the wound. The lower portion of the arm and the forearm were covered with circular straps of soap cerate. He was ordered to take the bark, and was allowed wine and porter. Oct. 30th.—The redness and swelling of

the upper part of the arm had subsided; pulse 100; purging returned. The bark left off and the chalk mixture and laudanum resumed, and an opiate clyster administered. Oct. 31st.—Pulse 120, the discharge from the abscess diminished; the purging continued; and at night he had a rigor. November 1st.—Pulse 120, voice feeble, no appetite, delirious at intervals. Ulceration had taken place at the opening of the abscess so that it was increased in size. He drunk two pints of water in the course of the day. Nov. 2nd.—Pulse very weak; countenance depressed; tongue brown; the ulcers had spread to the extent of two or three inches: mortification had taken place in the skin nearer to the axilla. His stomach rejected everything but porter. In the night he was delirious. Nov. 3rd.—The mortification had spread considerably; the purging continued. The forefinger, which had mortified, was now removed at the second joint. Nov. 4th.—He died, at 4.30 in the afternoon; that is, on the seventeenth day after the bite.

Post-mortem.—Nov. 5th. Sixteen hours after death he was examined by Mr. Brodie and myself, in the presence of Mr. Maynard, the house-surgeon, and several of the pupils of the hospital. With the exception of the right arm, which had been bitten, the body had a natural appearance; the skin was clear and white. The wounds made by the fangs at the root of the thumb were healed, but the puncture made by the lancet at the back of the wrist was still open. That part of the back of the hand which immediately surrounded the wound made by the fangs for the extent of one inch and a half in every direction, as also the whole of the palm, was in a natural state, except that there was a small quantity of extravasated blood in the cellular membrane. The orifice of the abscess was so enlarged as to form a sore on the outside of the arm, elbow and forearm, nearly six inches in length: round this the skin was in a state of mortification more than halfway up the outside of the arm and as far downwards on the outside of the forearm. The skin still adhered to the biceps flexor muscle of the arm and flexor muscles of the forearm by a dark-coloured cellular membrane. Everywhere else in the arm and forearm, from the axilla downwards, the skin was separated from the muscles, and between these parts there was a dark-coloured fluid with an offensive odour, and sloughs of cellular membrane resembling wet tow floating in it. The muscles had their natural appearance everywhere except on the surface that was next to the abscess. Beyond the limits of the abscess blood was extravasated into the cellular membrane, and this appearance was observable on the right side of the back as far as the loins, and on the right side of the chest over the serratus major anticus muscle. Within the thorax the lungs had their natural appearance. The exterior part of the loose fold of the pericardium, where it is exposed on elevating the sternum, was dry, resembling a dried bladder. The cavity of the pericardium contained about half an ounce of serous fluid which had a frothy appearance from the admixture of bubbles of air. On cutting into the aorta a small quantity of fluid escaped and had a similar appearance. The cavities of the heart contained coagulated blood. In the abdomen the cardiac portion of the stomach was moderately distended with fluid; the pyloric portion was rather constricted; the internal mem-

brane had its vessels very turgid with blood. The intestines and liver had a livid appearance. The gall-bladder was moderately full of healthy bile. The lacteals and thoracic duct were empty, and they had a natural appearance. Within the cranium the vessels of the pia mater and brain were tinged with blood: the ventricles contained rather more water than is usual, and water was effused into the cells connecting the pia mater and arachnoid. It is to be observed that these appearances of the brain and its membranes are very frequently found in cases of acute disease which terminate fatally.—Reported by Sir EVERARD HOME, F.R.S., *Philos. Trans.*, 1810, vol. i, p. 75. v. **Ca**, 18, l. 8, p. 244.

Ca:—BITES, *in Animals and Birds.*

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1. DOG.—A large spaniel bitten twice in the foreshoulder. It immediately manifested excessive pain at the part; this, however, soon passed off. Within twenty-five minutes he was languid, and remained standing with his head down, as though sick and confused. Very little local twitching, and the respiration was a little quickened. During the next twenty-four hours he refused to eat, but he drank at frequent intervals. He was able to move about, but preferred to remain at rest. There was no swelling, but a slight hardening of the surrounding parts for about two inches; and on pressure a little bloody serum might be forced out of the fang tracts: this continued for three days, when pus also flowed out. He was quite well again in a few days.—*Dog I*, MITCHELL, p. 70.

2. DOG.—A large spaniel, bitten in foreshoulder and hind leg. Immediately there followed swelling and local trembling. He whined at intervals for some hours, and suffered much pain. Recovered within two days.—*Dog II*, MITCHELL, p. 70.

3. Dog.—A large setter, bitten in shoulder and leg. Immediately great pain and swelling, the latter extending to the neck and chest; slight local trembling: within half an hour slight ineffectual effort to vomit, and some evidence of general feebleness, which passed off within five hours. Well the next day.—*Dog III*, Mitchell, p. 70.

4. Dog.—A white mongrel, bitten in left hind thigh. It suffered terribly, and during two hours whined and yelled incessantly. Enormous swelling occurred, involving whole thigh up to the pelvic joint. Two hours after being struck the dog was weak, but still kept his feet, and drank almost without ceasing. Respiration was occasionally jerking, and heart's action rapid and feeble. At the third hour he was again howling frightfully. The weakness was increased, and he staggered in his gait, the other symptoms being unchanged. At four and a half hours still weaker, ceased to drink, and finally lay down. The parts wounded were still enlarging. At this time he vomited a little food and mucus, and soon afterwards purged and urinated. From this time he began to mend; and, although he howled all the following night, he was able to run about next morning with only a slight appearance of lameness. The wound discharged blood, and at length bloody pus, and finally pure pus, up to the period of recovery three weeks later. During the first week of this time the dog took scarcely any food, and was subject to profuse dysenteric discharges, so that he became remarkably emaciated. From this condition he gradually improved: all the symptoms abated, and at the end of the third week he was as fat as when first injured.—*Dog IV*, Mitchell, p. 71.

5. Dog.—A small brown terrier, bitten twice on shoulder. Within ten minutes he vomited, urinated, and passed solid fæces. All this time he whined a good deal; and, finally, at the fifteenth minute, lay down on his side, breathing in jerks, and twitching in almost every muscle. An hour after being bitten he had a slight convulsion and vomited again. Meanwhile the heart could scarcely be felt to beat, and the respirations were long and laboured. At the seventh hour, when left for the night, he was lying on the floor, scarcely breathing, and nearly pulseless. He had passed liquid and very dark stools, and some urine. Even at this period his sensorium seemed unaffected, and he felt injuries, heard well, and followed with his eyes the movements about him. Next morning he was quite lively and tried to escape. His wound was like a lump on his side and back, and discharged fluid blood in occasional drops. The floor of the box in which he had been left contained a good deal of dark semifluid excrement streaked with blood, and he had drunk nearly a third of a bucketfull of water during the night.—*Dog V*, Mitchell, p. 71.

5 *a*. Dog.—A small terrier, struck twice on right flank by a large snake, both wounds being double fang marks. From one of the wounds blood immediately ran in a thin stream; after it had run for some time I caught a few drops in a watch-glass, and found it coagulated well. I was called away; and on returning at the end of an hour I found the dog standing with his head pendant, having just vomited glairy mucus. His pulse was quick and feeble; his respiration occasionally panting. The hæmorrhage had ceased. One hour an a half after he was

bitten I drew a drachm of blood from the jugular vein. It clotted perfectly. Four and a half hours after the bite, a drachm of blood from the same vein coagulated equally well. Twenty hours from the time of the poisoning, the dog was found lying on his left side, having passed slimy and bloody stools in abundance. At intervals he seemed to suffer much from tenesmus, but was so weak that he stood up with difficulty. His gums were bleeding, a symptom I had seen before, and his eyes were deeply injected. At this time about two or three drachms of blood were drawn. It was very dark, and formed within five minutes a clot of feeble texture. Twenty-seven hours and a half after the time at which he was bitten, the dog was weaker. His hind legs were twitching, and the dysentery continued. Three drachms of blood were drawn as usual, but no clot formed in this specimen; although it was set aside and carefully watched for some time. While I was collecting the fluid for observation the dog suddenly discharged per anum at least four ounces of dark grumous blood. At this time I supplied the dog with water and left him. Fifty-four hours after the bite he was seen again, and found to have drunk freely of the water, and to have passed fewer stools. Up to this date he declined all food. From this time he improved rapidly, and took with eagerness whatever nutriment was offered. On the fourth day his blood again exhibited a clot, although it was very small and of loose texture. I made no further examinations of the blood. The dog lost flesh as he gained strength, and had profuse suppuration from an abscess in the bitten flank. At the close of two weeks he was active and well, except that the wound was still open. This case is doubly valuable, as pointing out, even in a single instance, the time at which the blood became altered, and also as showing, once more, how profound may be the change, and how perfect the recovery. The dog survived very serious visceral lesions, and lived during two days with his blood in a condition of complete diffluence.—Dog V*a*, MITCHELL, Exp. iii, p. 93.

6. DOG.—A bull terrier, weighing 30 lbs., bitten on outside of right hind thigh. He drew up the leg, and whined for a few minutes. The wound bled a drop or two, and the muscles about it twitched considerably at intervals for an hour, when this symptom was obscured by the swelling. His pulse, which was naturally about 145 and irregular, was at the fifth minute 140 and regular; respiration 35. At the fifteenth minute he lay down much weakened, pulse 160 and feeble; respiration 40. At the twentieth minute the bowels moved loosely, with a gray discharge, and there seemed to be some tenesmus in the rectum. At the twenty-fifth minute he could stand when urged, but lay down again at once, and was much weaker. Forty-fifth minute, pulse 160; respiration 45, and laborious. Fifty-fifth minute, loss of power in hind legs. Eightieth minute, respiration quick and laboured, and so irregular as to make it impossible longer to count the heart pulses. Observation now interrupted; and on resuming, three hours afterwards, he was found dead. He had no foam about mouth, and probably died quietly.

P. M. Section.—The whole muscular and areolar tissue of the leg and thighs, half way up and down the limb, was dark with infiltrated blood. About the wound, the swelling was due to a mass of blood

partially coagulated. The extravasated blood extended through the limb, and on the inside it passed half way up the sartorius and adductors, and along the sheath of the vessels to within two inches of the femoral ring. Nearly an inch of the sheath was clear of it; but one-half inch below the ring the tissues were shaded with blood, and the same appearance was seen around the ring itself. From this point the extravasation extended under the peritoneum, into the pelvis, and on the inner face of the ilium. The colour of the tissues thus stained was a brilliant-scarlet. The abdominal viscera were healthy, except that the mucous membrane of the lower bowels was somewhat congested. The lungs were sound. The heart was relaxed, the right side full, the left nearly empty. The blood on the right side was a little darker than that on the left; on both sides, and everywhere else, it was perfectly fluid and free from clots. Placed in a vial, it remained fluid until decomposition ensued. Two hours at least after death, some of the blood globules found in the heart were slightly indented; those taken from the small vessels of the ear were perfectly normal.—Dog VI, MITCHELL, p. 72.

7. DOG.—A young dog; bitten, but place not discovered. He immediately cried out as though in great pain. Within five minutes he was trembling in every muscle. At the twentieth minute he was so much better he was subjected to a second bite, on neck, in front, above left shoulder. He at once lay down, then rose and passed water and solid fæces, and, at the fifth minute after second bite, fell on his side and vomited freely. The vomiting was instantly followed by general convulsions, in which the limbs were extended and the head thrown back. Meanwhile the heart was very feeble, the breathing laborious, and the pupils contracted. The character of the respirations at this time was singular:—eight or ten rapid respirations took place, and then none occurred until twenty seconds had elapsed. The heart beat, previously 180 to the minute, fell, at the fifteenth minute after the second bite, to 80, and became remarkably feeble. At the seventeenth minute the respiration stopped; and the heart pulse, though so weak as to be counted with difficulty, rose to 156; falling again, at the twenty-fourth minute, to 58, when it became indistinct through weakness. Pupils dilated. Death.

P.M. Section was delayed twenty-four hours. Post-mortem rigor came on first about the fore-legs and neck, and was complete four hours after death. It was so strong as to snap a small cord with which I had drawn the legs of the dog apart. The wound was the seat of an extravasation which had passed over the shoulder and on to the neck. The vessels near it were filled with dark and diffluent blood. The muscles near the wound were softened and readily torn. The heart contained an abundance of blood, chiefly fluid, with a number of small clots of very loose structure in the right side, and somewhat less in the left cavities. In the pericardium there was about an ounce and a half of bloody serum. The abdominal organs were healthy, and the peritoneum contained only a little straw-coloured serum. The bladder was partially contracted, and held an ounce or two of slightly albuminous urine.

The brain was normally firm, though somewhat congested, and its vessels were distended with fluid blood and a few bubbles of gas. At the side of the long sinus a little blood seemed to have soaked through all the membranes to the bone, but there was no large quantity of blood present at this spot, and no coagulum. It looked like a post-mortem stain.—*Dog VII*, MITCHELL, p. 73.

8. DOG.—A white dog, bitten in several places. At first no symptoms except increasing weakness and vomiting; bowels also moved and urine passed. The breathing then became jerking and laboured. The fremitus, at first localised in some of the bites, soon became general, until it disappeared before the profound debility which seemed to affect the entire economy. Three hours after the poisoning the animal died without convulsions.

P.M. Section.—The numerous bites were really the most formidable lesions found after death. Around them, in each case, was an irregular circle of extravasated fluid blood. None of them, however, were much swollen although the amount of blood spread out in their layers and soaked into the muscles must have been formidable. Except some congestion of the vessels of the brain and its membranes there was no morbid appearance in any viscus. The right heart was full of fluid blood. The left heart also contained more blood than usual, and its colour was a little brighter than that of the other side.—*Dog VIII*, MITCHELL, p. 73.

9. DOG.—White mongrel bitch; bitten over eye, and high up on inside of thigh. This latter wound gave great pain, and the bitch yelled and whined during several minutes. On examination there was found, around the wound on thigh, a growing circle of flattened swelling, of which the dark colour was easily seen through the skin. During half an hour she stood on her feet, her head hanging a little, and blood running so freely from the wound in the thigh that an ounce or two may have been thus lost within an hour. At the close of the half hour the bitch suddenly staggered and fell on her side, then rose and again fell. The pulse, which before the poisoning was 154, rose immediately after the bite to 175. When she fell it was about 160, irregular and feeble; after this its force diminished gradually, but the rhythm changed very little until just before death, when it fell rapidly. An hour after the bite the animal still lay on her side, making efforts to vomit. Upon lifting her up she succeeded in vomiting a little mucus, and passed a loose stool; and soon after lying down again passed water freely, which was acid and contained no albumen. One hour and twenty minutes after the poisoning the head was suddenly thrown back; the pupils were contracted; and the limbs were extended, though not violently. At the close of this momentary convulsion the bitch drew a long breath and expired.

P.M. Section.—The wound was a good deal swollen, and contained some loosely-clotted blood, and much more that was quite fluid, and so continued upon removal. The tissues in the track of the fang were only a little softened, but the thigh was literally soaked with blood down to the periosteal membrane, which was darkly stained. The other wound was but little swollen. The brain was apparently healthy. The

lungs were normal, the pericardium contained a little bloody serum. The heart was marked over the right ventricle with three star-like spots of ecchymosis, and a little ribbon of extravasated blood ran along each side of several of the smaller coronary veins.

The abdominal organs were healthy and the intestines the seat of active movement. The extravasation in the thigh extended up through the femoral ring, and over the brim of the pelvis, so that the areolar tissues between the left side of the bladder and the pelvic bones were filled with fluid blood.—*Dog IX*, MITCHELL, p. 74.

10. DOG.—Small brown dog; struck with both fangs by two snakes, one biting him on the muzzle, and the other on the side. The wound on the flank formed within two hours a prominent, almost pendulous mass, several inches long and wide. Within ten minutes this animal became feeble, and reeled about as if giddy. At length he lay down on his side, breathing heavily, passed urine and solid fæces, but did not vomit. The muscles about the flank wound twitched a good deal at first, and the general fremitus was well marked within thirty minutes. These passed off after half an hour longer, only recurring at intervals. The heart beat, which, after the bite, was strong and rapid, became scarcely perceptible to the hand. After lying thus for five hours he died quietly.

P.M. Section.—The wound on the flank presented the usual appearance. The skin beyond the bitten nostril was puffy and tumid, the nostrils exuding bloody mucus. All the thoracic organs were normal, the heart as usual, the right side full of fluid blood, with some loose dark clots, the left side almost empty. Elsewhere the organs were healthy, excepting the kidneys which were full of blood, and presented the appearance of acute congestion. On further inspection, a long thin clot was found in the left ureter, and bloody urine in the bladder below. Brain not examined.—*Dog X*, MITCHELL, p. 75.

11. YOUNG DOG.—Passed urine soon after the bite, then howled and staggered. Belly distended; painful round the wound, which remained as a dark spot, charged underneath with blood, and swollen. After piteous howling it lay on its side. Ecchymosis set in; pale bloody serum from the wound. Half an hour after the bite giddiness, turning round. Resting on the fore paws, stretched out, swinging, lying on the side, then lying on the back for four hours; then death without convulsions.

P.M. Section.—Examined after a quarter of an hour. The covering of the stomach was charged with blood, as if from violent blows; peritoneum also red, its veins swelled out with blood, so in the stomach and intestines. Mucous membrane unaltered. In the brain a patch of extravasation of blood under the arachnoid membrane.—C. HERING, S. 130, *Harlan, Amer. Trans.* (N. S.), iii, part 2.

12. DOG.—Bitten on inside of fore leg. The wound bled, and the dog soon grew very sick, and struggled to vomit, but brought up very little. He frothed at the mouth, and bit at the grass, which he champed as if he were mad, so that every one was afraid of him: he was therefore put into a room and left till morning. Next morning

he appeared to have recovered, and on being let out ran home. About a month afterwards all his hair fell off, so his master killed him.—CAP. HALL, *Philos. Trans.*, vol. vii, p. 199.

13. DOG.—Bitten on the extremity of the nose. He was immediately affected; howled, shook, fell down, and foamed at the mouth. In about ten minutes he discharged his excrements involuntarily tinged with blood. He died after about two hours.

P.M. Section.—Examined next day. The abdominal contents were very much inflamed, especially the stomach and intestines, which appeared nearly equal to the finest injection. The stomach and intestines contained a mucous matter, the greatest part of which was blood; and the fine villous coat, which is so visible in this animal, was entirely destroyed. The pleuræ and their vessels looked as if injected. The heart was stretched with blood, as were also its vessels. The vessels of the membranes of the brain made a most beautiful figure from the quantity of blood contained in them, as did likewise the blood-vessels of the nerves. There was a small quantity of water between the hemispheres. The blood contained in the heart and its vessels was about the consistence of cream.—JOHN RANLY, F.R.S., Surgeon, *Philos. Trans.*, vii, 218.

14. A YOUNG WOLF, three months old, was bitten in left flank. Within fifteen minutes the leg was much swollen, and the animal exhibited signs of great uneasiness, yawning and stretching and looking about in an anxious manner. These symptoms increased to inability to stand, and to drowsiness and slight convulsive movements.

The next day bitten again in three places by same snake. Within two minutes it was unable to stand, had gasping respiration and fixed expression of countenance. It died comatose.—HAMMOND, *Amer. Journ. of Med. Scien.*, vol. xxxv, p. 94, 1858.

15. PIGEON.—Struck on back. It walked across the table, and, seeking a corner, remained at rest until, at the close of three minutes, it fell down and immediately began to breathe convulsively, now and then gaping and making efforts to rise. The difficulty in the respiration seemed to be due to the general weakness, which interfered with all the other movements at the same time. The bird became more and more feeble, the breathing was laboured, and, at the end of the seventh minute, the head fell to one side, the breathing ceased, and it died without convulsions.—*Pigeon I*, MITCHELL, p. 64.

16. PIGEON.—Struck by two snakes. In two minutes the bird showed signs of weakness, staggered to and fro, and at last, as is usual, sought refuge in a corner. At the sixth minute its breathing became laboured and jerking, and the muscles about the wound were twitching locally. At the sixteenth minute the breathing was still jerking, but more rapid; the bird crouched as if asleep; the eye natural, the pupil if changed at all a little contracted. At the thirty-sixth minute the head fell, the eyes closed, respiration became rare and laboured, and the pupils contracted. Cloac temperature 104·5° F. At the fortieth minute the head was bent suddenly forward on the breast, and after three such motions of a convulsive nature respiration ceased at the forty-second minute.—*Pigeon II*, MITCHELL, p. 64.

17. PIGEON.—A pigeon that had recovered from a former bite with the loss of a portion of the pectoral muscles. Now well and active. "Upon its being again bitten," says Dr. Mitchell, "I threw it from me, but, to my surprise, its wings were motionless, and it fell a dead weight on the table, and did not afterwards breathe or move. Thirty seconds elapsed between the bite and the death."—*Pigeon III*, MITCHELL, p. 65.

18. PIGEON.—Struck on the breast, most of the venom being lost on the feathers. Three hours after the bite, the bird drooped a little and was disposed to sleep. A few hours later this tendency had passed away, but the wound was dark and swollen, from effused blood. On pressure a little serous blood flowed from the wound. Within five days the skin gave way, and the parts beneath sloughed to the bones. At the close of this process on the sixth day, the bird died; probably of mere exhaustion and constitutional irritation.—*Pigeon IV*, MITCHELL, p. 65.

19. PIGEON.—Bitten by an exhausted snake. Much enfeebled and disposed to sleep, and sank lower and lower until its head touched the table, when it rolled on its side. It died without convulsions, nearly eleven hours after the bite.—*Pigeon V*, MITCHELL, p. 66.

20. PIGEON.—Bitten by an exhausted snake. Much enfeebled and disposed to sleep. It died in violent convulsions with the head thrown backwards, during the eighth hour.—*Pigeon VI*, MITCHELL, p. 66.

21. PIGEON.—Struck on back by a small snake. It instantly sought a corner, and in ten minutes fell into the usual stupor, with jerking, abrupt respiration. This condition seemed to lessen an hour later, but only for a time, and the bird finally sinking down, became weaker and weaker, and died without convulsions at the close of five hours and a half. The pupils gradually contracted before death, and suddenly dilated afterwards.—*Pigeon VII*, MITCHELL, p. 66.

22. HORSE.—Dr. Bell supplies the following: "On the Rio Grande, in October, 1867, two horses were bitten by the same rattlesnake, while grazing. A few hours afterwards the submaxillary, parotid and all glands situated about the head and neck were greatly enlarged; from the nostrils and mouth a clear mucous discharge ran down; the eyes were glairy, with pupils greatly dilated, and the coat was rough and staring. To each animal he gave half a pint of whiskey, in a little water, and half an ounce of ammonia; while the wounds were fomented with a strong infusion of tobacco, and afterwards poulticed with chopped tobacco leaves. Both horses recovered; one, although reduced in flesh and thrown out of condition, was fit for work in a week; but the other only just escaped with his life; he became a perfect skeleton, and only commenced to mend at the end of three weeks."—BELL'S *New Tracks in North America*; also *Mon. Hom. Rev.*, xiv, 442.

24. GUINEA-PIG.—The snake made one dart at its victim, striking it on the back of the neck, and an instantaneous effect was produced. Instead of moving about with the ordinary alternation of flexion and extension of the extremities, it commenced hopping on all fours, as if the limbs had become rigid: and within three minutes it fell on its side and expired.

Remarks.—The symptoms were manifestly of a tetanic character, though different from the results produced by strychnine.

P.M. Section.—Shortly after death from bite on back of neck. The guinea-pig exhibited very trifling external hæmorrhage at the back of the neck. On removing the integuments, a great deal of subcutaneous, submuscular and intermuscular sanguineous extravasation was found at the spot; it covered a space of the size of about half-a-crown, and was of a very dark purple colour. Examined under the microscope this blood, and blood taken from the brachio-cephalic vein and the aorta, showed some large oil drops, but otherwise it showed no deviation. The corpuscles did not form rouleaux. The heart was congested: the aorta contained dark fluid blood. There was slight superficial congestion of the brain. Out of one of the larger vessels in the cerebrum some blood flowed, which broke up into crystalline masses resembling hæmatin.

Remarks.—I am inclined to look upon the above effects as affording direct evidence of the poison having, even within the short space of three minutes, exerted an undeniable disorganising influence upon the blood. . . . . I may be allowed to sum up the preceding observations in a few words: "We have seen two animals of the same species subjected, under the same circumstances, to the influence of the most powerful poisons that we are acquainted with; in one [bitten by a puff-adder, the clotto arietans] paralytic, in the other [bitten by a rattlesnake] tetanoid symptoms, supervened instantly on the application of the poison, and death ensued in three minutes. We have not ascertained the mode in which these results are brought about; but it does appear that something beyond a mere dynamic agency has been shown to operate—that, in fact, the mode in which death ensues is through the alteration produced in the blood by the virus."—H. E. SIEVEKING, M.D., *Med. Times and Gazette* (N.S.), v, 130.

25. RABBIT.—A large white rabbit, bitten on left hind paw. It rolled over, gasping and slightly convulsed, and was dead in one minute.

P.M. Section.—No lesion was found in any organ. The fore-feet twitched for some few minutes after death, and the skin muscles moved to and fro in a singular manner. The heart was beating actively, but feebly, just after death, and continued locally irritable for over an hour and a half. The muscles and motor nerves were perfectly excitable several minutes after death. The blood coagulated firmly and rapidly; a perfect case of acute poisoning.—*Rabbit*, MITCHELL, p. 67.

26. RABBIT.—Struck on the back. A few minutes after the bite it was seized with weakness, gritting of the teeth, and rapid respiration. It passed urine and fæces and remained feeble during some hours. From this period the weakness abated somewhat, but the back continued to swell. On the second day the local signs were improving, but the animal had passed some very albuminous urine, and a large amount of blood mixed with the fæces. The symptoms of general weakness now increased, and the hind legs began to drag; the movements were uncertain, and the bloody purging grew worse. It died on the third day.

P.M. Section.—The wound was surrounded by half an ounce or more of dark fluid blood. The vessels in the neighbourhood were full

of a similar fluid, but there was no vascular redness, like that of acute inflammation. The muscles in the track of the bite, which was a double fang mark, were remarkably softened, and could be torn with the utmost ease. The brain was highly congested, and there was a good deal of bloody serum in the cavities of that organ. Similar congestion existed in the spinal canal, and at several points the white nervous tissue was stained with small patches of blood. The lungs were healthy. The pericardium was curiously distended with bloody serum. The heart was contracted and contained but little blood, and that dark and diffluent. The intestines were spotted at intervals, with ecchymoses four to five lines in diameter, and apparently just beneath the serous covering, the cavity of which contained a little bloody serum. The intestines from the œsophagus to the rectum were dotted with ecchymoses and filled, especially the large gut, with blood and mucus. The right kidney was large and absolutely soaked with dark fluid blood. The left kidney was more healthy. The bladder and ureters contained a good deal of bloody urine. How the rabbit lived so long with such a singular complication of serious lesions it is difficult to conceive.—*Rabbit*, MITCHELL, p. 67.

27. RABBIT.—Bitten on fore shoulder. Prostration and loss of power, without loss of sensation or cerebration. Jerking respiration. General twitching, pulse rapid and feeble. Died gradually, after 38 minutes, without convulsions.

P.M. Section.—Small area of extravasated blood. Heart dark, relaxed, and full of blood on right side especially. Slight fulness in vessels of brain.—*Rabbit I*, MITCHELL, pp. 68-9.

28. RABBIT.—Bitten on hind leg. Leg swelled enormously up to spine. Prostration: gritting of teeth; local and general twitching; jerking respiration, pulse rapid and feeble; gradual loss of power; but with retained ability to hear, see, &c., until death, which took place gradually, after five hours and four minutes, with slight general convulsions, head thrown forwards, feet extended.

P.M. Section.—Extensive effusion of blood, partly clotted, and reaching up leg to flank and down to foot, and soaking the muscles to the bone. Heart contained a good deal of blood on both sides: a little bloody serum in pericardium. The cæcum contained a good deal of dark blood in patches. One small clot in left ventricle: elsewhere the blood was fluid.—*Rabbit II*, MITCHELL, pp. 68-9.

29. RABBIT.—Bitten on neck. Slight swelling and local twitching. Sudden loss of motor power; gasping; prostration; very quick respiration, and pulse rapid and feeble. Died gradually without convulsions, after one hour and ten minutes.

P.M. Section.—Slight extravasation of blood. Heart full on both sides. Intestines dotted with small spots of extravasated blood. Blood uncoagulable.—*Rabbit III*, MITCHELL, pp. 68-9.

30. RABBIT.—Bitten on neck. Slight swelling and local twitching; pulse rapid and feeble; sudden prostration. Death in twenty-seven minutes with violent convulsions.

P.M. Section.—Slight extravasation of blood. Heart full on both sides. Blood coagulated well.—*Rabbit IV*, MITCHELL, pp. 68-9.

31. RABBIT.—Bitten on hind leg. Loss of motor power; prostration; jerking respiration; pulse rapid and feeble; general twitching. Death in forty-three minutes, with violent convulsions.

P.M. Section.—Slight and thin layer of extravasated blood. A little bloody serum in ventricles of brain. Blood loosely coagulated.—*Rabbit V*, MITCHELL, pp. 68-9.

32. RABBIT.—Bitten on fore paw. Prostration; gradual loss of motor power; gritting of teeth; slight jerking in respiration; pulse rapid and feeble; singular and incessant movement in skin muscles. Gradual and easy death without convulsions, in nine hours.

P.M. Section.—Part enormously swollen with blood, partly in loose clots when let out by incision *at the third hour*. Bloody serum in pericardium and both pleuræ: two extensive extravasations in right lung. Great vascular fulness in brain. Blood uncoagulable.—*Rabbit VI*, MITCHELL, pp. 68-9.

33. RABBIT.—Bitten on neck and head. Local twitching; sudden prostration and loss of motor power; respiration quick and laboured, but not jerking; pulse rapid and feeble. Died in twelve minutes, gradually, with slight convulsive movements of limbs and the skin muscles.

P.M. Section.—Scarcely a trace of any local lesion except fang wounds. Right side of heart much distended with blood. Blood perfectly coagulable.—*Rabbit VII*, MITCHELL, pp. 68-9.

34. RABBIT.—Bitten on fore leg. Symptoms of weakness, suddenly developed, fifteen minutes after the bite; respiration jerking; pulse rapid and feeble. Death gradual and easy, without convulsions, in two hours and nine minutes.

P.M. Section.—Extravasated blood between skin and muscles up to thigh. Heart large, and full of blood in all its cavities. A few small spots of blood under peritoneum of small intestines. Blood uncoagulable.—*Rabbit VIII*, MITCHELL, pp. 68-9.

35. FROG.—Bitten on back. It immediately uttered a cry, and there was a little quivering on the flank. Occasional convulsive movements of limbs. Died within two hours.—*Frog I*, MITCHELL, p. 55.

36. FROG.—Bitten on belly. Slight local quivering of the nearer muscles, and some convulsive extensions of hind legs. Pupils dilated after death, which happened at end of an hour.—*Frog II*, MITCHELL, p. 56.

37. FROG.—Struck on spine. At once appeared very uneasy, and for ten or twelve minutes leaped about incessantly. At the close of half an hour it became suddenly quiet, and shortly afterwards was attacked with general quivering of the muscles, followed by the loss of volitional control.—*Frog III*, MITCHELL, p. 56.

38. FROG.—Struck on back of pelvis. Twenty-five hours afterwards was found to be inert and sluggish. Its back was darker than usual, and presented a fluctuating mass of fluid underneath the skin. The eyes were natural, and the respirations occurred now and then. Next day it was much the same. On the third day it was motionless, except under excessive stimulus, and if placed on its back turned itself

over with great difficulty. On the fourth day the swelling on the back diminished somewhat, and the subcuticular sacs of the legs became swollen. It gradually grew weaker; and died on the fifth day.—*Frog IV*, MITCHELL, p. 57.

39. FROG.—Struck in thigh. During the five succeeding hours, the frog remained in one position, quite motionless; bloody serum exuding from the wound. It died in about twelve hours.—*Frog V*, MITCHELL, p. 57.

40. FROG.—Struck in thigh. From the wounds a bloody serum continually oozed, all that and all the next day—some drachms. On the third day the frog was very sluggish. The bitten leg was enormously swollen to the very end of the toes, which, on being held up to the light, were seen to be distended with red serum. The skin of this limb was also soaked, in places, with extravasated blood. It died during the third night.—*Frog VI*, MITCHELL, p. 58.

41. FROG.—Struck on back. The muscles about the part immediately began to quiver; and this motion soon extended to both flanks. The frog became rapidly weak, and within an hour and a half could not turn when laid on its back, and was unable to use its hind legs. The pupils were contracted, the eyes half closed, and the lids of the right one completely insensible, of the left one nearly so. The frog shortly afterwards lost all voluntary power, even in the fore legs.—*Frog VII*, MITCHELL, p. 58.

ARRANGEMENT OF THE PATHOGENETIC MATERIAL

OR

REGISTER OF SYMPTOMS.

In the following "Register" the familiar Hahnemannian order of parts has been adopted, making twenty-three "Sections:"

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§ 1. Intellectual and Emotional Symptoms (1—44).

v. § 9, p. 154.

1. Remarkable weakness of memory.—LINGEN, CONS. HERING 57, A 1, p. 195.
2. Makes mistakes in writing; does not spell correctly.—LINGEN, C. H. 65, A 1, p. 195.
3. Unusual obtuseness and stupidity first day; by reason of which he cannot express himself correctly; and therefore does not note down some symptoms.—SCHMÖLE, C. H. 75, A 1, p. 195.
4. For a few days a certain diffidence in the selection of medicines, which previously had been a pleasant task.—SCHMÖLE, C. H. 3042, A 1, p. 195.
5. Excessive sensitiveness; for example, on reading Humboldt's address to the scientists of Berlin he was moved to tears.—LINGEN, C. H. 3084, A 1, p. 195.
6. Heavenly sensations; succeeded by a general dropsy, which lasted a long time. After pure venom in pills.—WALLACE, l. 16, A 13, p. 200.

6*a*. Along with sensitiveness to noise (s. 160*a*) and various hæmorrhages (s. 390*a*), her temper was dreadfully irritable and cross, so that the least annoyance sent her into a fury; this was very contrary to her natural disposition. *Whilst taking* 1[x], *three drops four times a day.*—Mrs. B., **A** 6*b*, l. 8, p. 198.

7. Visible trembling all over for five minutes, followed by uneasiness, distress and timidity, succeeded by sleepiness, stupor, and snappish temper. It continued in this state all the day, and in the evening it vomited. Next day it was dull, quiet, and snappish. *After four drops of pure venom with water.—Kitten*, HAYWARD, **A** 12, l. 5, p. 201.

8. Mewed distressingly and passed into a corner, then crept to a towel and sat upon it; then moved again to the corner, panting and breathing laboriously, and appearing restless; moved about for a while and then sat down and closed her eyes. Then pushed herself backwards into the corner again; was restless, and pawed at throat and mouth as if they were uncomfortable. *A few minutes after one drop of* 1[x] *injected under skin.—Kitten*, HAYWARD, **B** 3, l. 4, p. 207.

9. Trembled all over and breathed very rapidly; refused to walk about, even when urged to do so; became quiet and stupid; lay down on the belly and mewed distressingly. *A few minutes after five drops of* 1[x] *injected under skin.—Kitten*, HAYWARD, **B** 3, l. 23, p. 207.

10. After a congestive headache (v. symp. 113) during the fifth day noticed myself making very absurd mistakes in spelling, having to write very familiar words three times over; thinking of the proper letter but writing a wrong one; this continued all the next day, accompanied by great languor and reluctance to rise in the mornings. *After rubbing a little venom into scratch on wrist.*—HAYWARD, **B** 1, l. 66, p. 203.

11. After slight topical effects (v. symp. 558) and severe dizziness (v. symp. 49), next morning after breakfast could not think, comprehend or remember distinctly; could not as usual hold the mind to a subject, and all forenoon could not as usual comprehend or follow conversation. Perception appeared blunted so that on walking in the street would have been run over but for her sister's watchfulness. Memory was so affected that after getting into a shop had forgotten what she went for. This was followed in the evening by pains in abdomen and forehead (s. 49), and next morning still some mental dulness, which disappeared during the day. *After rubbing a little venom into scratch on wrist.*—E. D., **B** 2, l. 16, p. 204.

12. Quiet, with occasional twitchings, mainly of head and neck; sluggish and disinclined to move. *Twelve minutes after hypodermic injection of dissolved dried venom.*—GUINEA-PIG, **B** 13, l. 6, p. 129.

13. Evidence of mental and bodily distress and restlessness.—*Kitten*, HAYWARD, **B** 3, ll. 4, 8, 10, 13, and of quietness and stupor, l. 24, p. 207.

14. Sluggishness supervened shortly and continued until death on the third day. *After injection into lymph sac.*—FROG, **B** 16, l. 6, p. 209.

15. A good deal of wheezing and coughing ensued; and within ten minutes the pigeon became drowsy, rocked to and fro, and at the close of thirty-eight minutes fell down. Convulsions followed at the

forty-third minute, and terminated in death at the forty-ninth. *After inspiration of two drops of pure venom in water.*—PIGEON, B 4, l. 5, p. 207.

16. Thought he was dying, and was in a terrible state of nervous agitation, and suffering most intense pain in the entire limb, which was swollen to more than twice its natural size, and was of a livid spotted colour. *Four hours after bite on hand.*—CHAS. S., C 16 *a*, l. 8, p. 220.

17. Between four and five hours after a bite on finger the man became stupid, and took no notice of what was passing around him; this lapsed into complete coma, and he died six hours after the bite.—WAINWRIGHT, C 30, l. 27, p. 231.

18. Loss of consciousness. Next day had no knowledge of what had been done for him shortly after bite. *After a bite.*—ESSEN, C 10, l. 22, p. 217.

19. Skin cold; pulse 100; answers incoherent, and he complained of sickness. *Two hours after bite on thumb and finger.*—SOPER, C 33, l. 9, p. 234.

20. The state of torpor [S. 355, also l. 11] continued for an hour. He then vomited with relief. *An hour and a half after two bites on hand.*—DRAKE, C 28, l. 27, p. 226.

21. Along with marked influence on hearing and vision; heart, respiration, and temperature, with thirst, vomiting, and diarrhœa, and paralysis of extremities. "The lad was delirious and drowsy, and from the third to the sixth hour there were great restlessness and some twitching, and during his delirium he uttered plaintive and feeble moans." Under stimulants these symptoms passed off within a few hours (l. 61); and after reaction had set in he complained of pain in his head, and after this he had two convulsions. *After a bite on hand.*—JEF., C 30 *a*, ll. 15, 42.

22. Great languor and delirium. *Ten hours after bite on toe.*—WOMAN, C 13, l. 18, p. 218.

24. Partially delirious and continued so for three days; anxious and uneasy; and very restless. *Beginning ten hours after bite on finger.*—BURNE, C 15, ll. 4, 17, 21, p. 218.

25. In addition to the intense pain and swelling of the hand and arm there was intense restlessness, which was worse to bear even than the pain; so that he could neither sit, nor lie, nor stand, but paced up and down the house like one distracted, which indeed he was. During the night he took a few doses of arsenicum 3 cent. trit.: this entirely removed the restlessness, but had no influence on the pain. *First day and night after bite on palm.*—SHIPMAN, C 8, l. 16, p. 216.

26. He became very agitated, anxious and pale, and a cold sweat bathed his face and chest, and his eyes expressed anxiety. *A few minutes after two bites on hand.*—DRAKE, C 28, l. 3, p. 226.

27. Great restlessness and anxiety. *Five hours after bite on finger.*—STEEL, C 22, l. 17, p. 221.

28. The wounded hand and arm are inflamed and very painful; there is great restlessness; he cries distressingly, calls for religious

consolation, and refuses his medicine; and every time he drinks the pain and restlessness are increased. [He becomes calmer after the fourteenth hour v. l. 80.] *Twelve and a half hours after bite on hand.* —MACH., C 29, ll. 73—79, p. 230.

29. Great anxiety and uneasiness, with pain in whole head. *Fifteen minutes after bite on foot.*—Woman, C 12, l. 3, p. 217.

30. Depressed, restless and uneasy, with great debility. *Eighteen hours after bite on arm.*—LAKE, C 26, l. 13, p. 225.

31. Great distress; spoke in whispers. *Forty-eight hours after bite on thumb and finger.*—SOPER, C 33, l. 53, p. 235.

32. Declares himself in great agony, and groans frequently; though respiration free, quite tranquil and sitting up. *Seventeen hours after bite on hand.*—MACH., C 29, l. 91, p. 230.

33. Feeling of great depression, with cold skin and weak pulse. *Six and a half hours after bite on thumb and finger.*—SOPER, C 33, l. 11, p. 234.

34. His mind was calm and self-possessed, and he had hope of recovery; but he was readily annoyed by the least noise. *Three and a half hours after two bites on hand.*—DRAKE, C 28, ll. 34, p. 227.

35. Great uneasiness, yawning, and stretching and looking about in an anxious manner; followed by drowsiness and slight convulsive movements. *A few min. after bite.*—WOLF, Ca, 14, l. 3, p. 243.

36. Within twenty minutes he was languid and remained standing with his head down, as though sick and confused; and respiration was a little quickened. *After bite in shoulder.*—DOG, Ca 1, l. 3, p. 237.

37. Fell into the usual stupor, with jerking, abrupt respiration. *Ten min. after bite.*—PIGEON, Ca 21, l. 2, p. 244.

38. It immedtately sought a corner and remained at rest. *After a bite on back.*—PIGEON, Ca 15, p. 243.

39. Whined a good deal, and after fifteen minutes lay down on his side, breathing in jerks, and twitching in almost every muscle. *After bite on shoulder.* DOG, Ca 5, l. 3, p. 238.

40. He whined at intervals, and suffered much pain. *Immediately after bite on shoulder.*—DOG, Ca 2, p. 237.

41. Suffered terribly, and during two hours whined and yelled incessantly, with enormous swelling of the bitten limb. *Immediately after bite on thigh.*—DOG, Ca 4, p. 238.

42. General quivering of the muscles, followed by loss of volitional control. *Half hour after bite on spine.*—FROG, Ca 37, l. 4, p. 247.

43. The frog became suddenly quiet. *Half hour after bite on spine.* —FROG, Ca 37, l. 3, p. 247.

44. At once appeared very uneasy, and for ten or twelve minutes leaped about incessantly. *After bite on spine.*—FROG, Ca 37, p. 247.

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Pathogenetic Commentary.

From the foregoing symptoms it is evident that Crotalus produces a considerable disturbance of the mental faculties; and that the leading character of this disturbance is depression without previous excitement; as if the brain had been intoxicated by carbonic acid, or by degraded or non-oxygenated blood, which indeed is the case. The intellectual powers are diminished or blunted, even to stupor; the emotions are depressed, even to despondency and moaning; and there is great anxiety, intense restlessness, and much delirium. The delirium is similar to that of zymotic or alcoholic intoxication, venous congestion, or exhaustion. After death, in subacute and chronic cases, the cortical substance of the brain and the membranes of the brain are found in a state of engorgement, with dark, fluid, degraded blood; the cortex highly congested, and stained of a deep brown colour; the arachnoid thickened, tough, opaque, and adherent to the pia mater; and the meshes of the latter distended with serum; extravasation and ecchymoses v. Ss. 124—132. These post-mortem appearances are very similar to those found in zymotic and septic diseases, especially in their malignant forms. The most marked intellectual symptoms are confusion, hesitation, mistakes in orthography, weakness of memory, sluggishness, torpor, and stupidity; and the most marked emotional symptoms are uneasiness, agitation, anxiety, fear, distress, anguish, and agony. Many of these symptoms appear to be "contingent," being altogether independent of the dose. But most of the symptoms of Crotalus hitherto collected are "absolute," in consequence of their being results of "bites" and "experiments," rather than of "provings;" and hence, also, they are more objective than subjective. This is a deficiency which it is to be hoped, for the sake of suffering humanity, and for the honour of our profession, will be rectified in the near future.—v. § 10, p. 155.]

Therapeutic Application.

Corresponding with these general mental disturbances the therapeutic sphere and usefulness of Crotalus in the treatment of mental disorders are both large and important. Besides being indications for the use of Crotalus in the treatment of zymotic and septic diseases; alcoholic, menstrual, and albuminuric intoxication; and in sunstroke; the above symptoms point to its usefulness in many special mental disorders, such, for instance, as

Delirium tremens, especially after repeated attacks, and in broken-down constitutions, combining, as it does, in one, the powers of the four principal medicines for this state—hyo—dig—tar—ars—it meets as well the cerebral, cardiac, gastric, and hepatic symptoms. There is, indeed, no other drug so effective a physiological and medicinal antidote to the effects of alcohol: this is evidenced by the almost impossibility to intoxicate with alcohol a person severely envenomed.—v. C 3, 5, 10. Its suitableness is further indicated by the sleeplessness, anguish, and distress, and which are, in both cases, partly mental and partly bodily.

Mania, especially in zymotic diseases, in broken-down constitutions, and in drunkards, and when connected with puerperal or ovario-uterine disease, and particularly when marked by uneasiness and restlessness, or timidity, fear, suspicion, snappishness, depression, or quiet indifference; or by moans, groans, or anxiety and distress, partly mental and partly bodily; or by fits of drowsiness, or coma; or by very defective memory, and mistakes in the use of words, or by loquacity.

Melancholia, especially when connected with some blood degradation, such as exists in puerperal and ovario-uterine disturbances, menstrual irregularities, menopausia, menorrhagia, or hepatic or splenic disease, and particularly when marked by timidity and fear, by anxiety, distress, anguish, moaning, and groaning; or by weeping mood, agony, and despair; or quiet indifference, or snappish temper.

Dementia, especially when following mania or melancholia under the circumstances above noticed, or dependent on senile degeneration of the brain, and when marked by stupidity, torpor, sluggishness, forgetfulness, mistakes in speaking, writing, and spelling, incoherency, hesitation, or restlessness, or quiet indifference.—v. ss. 10, 11.

Aphasia, or rather *Paraphasia*, where there are confusion and forgetfulness of letters rather than words, and more mistakes in orthography than in speech, and especially when this is connected with any septic or zymotic disease, or other toxæmia.—v. ss. 2, 3, 10.

General paralysis of the insane.—Bearing in mind the conditions mentioned under the four former headings, and recollecting the lethargy, weakness, debility, powerlessness, staggering, trembling, vertigo, numbness, loss of co-ordination of movement, and the general paralysis of Crotalus, it will be readily admitted that its administration would be likely to be followed by benefit in cases of general paralysis of the insane, after the symptoms of excitement had subsided or been removed.

Clinical Experience.

In the treatment of mental disorders not much absolute experience with Crotalus has yet been recorded. The present writer has frequently observed mental delusions diminish or disappear under its use. The following case, amongst others, has occurred in his practice: H. D—, aged 69, during the incipient stage of senile dementia, was frequently and remarkably relieved by a few doses of Crotalus 6, of many of his mental delusions, such as mistakes in keeping his accounts and in writing letters, forgetfulness of figures, names, and places; awaking in the night struggling with imaginary foes; imagining himself surrounded by enemies or hideous animals; taking antipathies to the members of his family, &c., &c. And Dr. Wallace wrote:—"The delirium of typhus, continuing muttering, (typhomania), is almost immediately removed, and a serene mind, expressive of pleasure, follows; melancholy is quickly changed into gay anticipations." **A** 11, l. 24, p. 200.

Dr. Mackechnie says: "Lately I have used Crotalus with great advantage in a case of delirium tremens, where there was nearly constant drowsiness, but with the usual inability to sleep."—*Brit. Jour. Hom.* xxxi, 131.

Further evidence in support of the curative power of Crotalus in mental affections is afforded by the many cures recorded with the much more familiar and very similarly acting serpent venom, lachesis; v. *Jahr's New Manual*, II, 26; Bibl. III n. p. 163.

One case may be given in illustration: "A youth became deranged from excessive study; symptoms—extraordinary loquacity, which was quite uncommon with him; he carries on incessant prologues, in the choicest expressions; changes rapidly from one subject to another, and treats of most outrageous matters; he is proud and suspicious of his friends: lah. 30 cured him quickly." *Archiv* IV, par. 1, p. 7, *Brit. Journ. Hom.*, xii, 472, v. also *Amer. Hom. Rev.*, 1863, 553. It has very frequently been used with advantage in delirium tremens. And yet further evidence is afforded by the experience recorded with the other very similarly aching serpent venom, naja; of which Dr. Rutherford Russell says: "It relieves very soon the dragging and anxiety at the præcordia occurring in great grief, also smarting pains in the back from the same cause" (*Brit. Journ. Hom.*, xi, 598).

§ 2. Sensorial Symptoms (45—79).

v. § 9, p. 154.

45. Confusion of whole head. LINGEN, C.H. 47, **A** 1, p. 195.
46. Vertigo before the eyes, even to falling; the pupils a little dilated; face chalkey white, with blue round the eyes. *On first day.*—SCHMÖLE, C.H. 5, **A** 1, p. 195.
47. Vertigo with nausea and sensation of discomfort on movement. —KUMMER, C.H. 198, **A** 1, p. 195.
48. Vertigo; headache in forehead above eyes, in temples, worse in night; with nausea and vomiting of bile; is obliged to lie down; together with constipation: better from walking in open air.—C.H. 262, **A** 1, p. 195.
49. After slight topical effects (v. Sym. 558) in about two hours; whilst sitting, giddiness came on so severely as nearly to cause falling from seat, and compelling to remove to an arm chair; it was

relieved by resting head and keeping it still, but recurred on slightest movement. Heaviness of head then came on as if it would tumble about from weakness of neck muscles, requiring hands to support it. Both relieved by night's sleep. Next day mental incapacity (v. Sym. 11). *After a little venom was rubbed into scratch on wrist.*—E.D., **B** 2, l. 6, p. 204.

50. Transitory vertigo, with nervous trembling. *Immediately after inoculation.*—MANZ, **B** 3 *a*, l. 5.

51. Yawning.—SCHMÖLE, C.H. 2705, **A** 1, p. 195.

52. Seated and quiet. *Twenty-one hours after inserting into muscles of back a little dried venom.* FROG, **B** 6, l. 3, p. 207.

53. Extended on ground motionless and speechless, and his jaws locked; with a very feeble, fluttering, and scarcely perceptible pulse. *Shortly after bite.*—ESSEN, **C** 10, l. 4, p. 217.

54. Along with strange local discoloration and swelling (S. 565) there came on great prostration, and deathly nausea so great that syncope would occur on assuming the upright position. *Four days after bite on finger.*—Mr. R—, **C** 16 b, l. 16.

55. Immediate prostration, with loss of sight, so that he fell to the ground before he had walked a hundred yards. He had to be supported between two persons; he was completely powerless and had no control over upper or lower extremities. The countenance was livid; and he was in such a lethargic state that he had to be spoken to in a loud tone, like one intoxicated. *After a bite on heel.*—FRANCISCO, **C** 6, ll. 5—15 *et seq.*, p. 214.

56. Sudden paleness of face; and on attempting to sit down he fell over. There was general relaxation of the muscles, and total loss of movement and power: his head hung upon his chest: there was stertorous breathing, syncope, and involuntary evacuation of urine and fæces; with cold extremities. *Twenty-five minutes after two bites on hand.*—DRAKE, **C** 28, ll. 4, 10, p. 226.

57. Nearly comatose; surface cold; pulse imperceptible; heart beats 55; respirations 14, and labored: constant vomiting. Both hands and arms mueh swollen and very painful, and glands in axilla inflamed. *Five hours after bite on palm of one hand.*—IRISHMAN, **C** 7, l. 4, p. 215.

58. The attacks of fainting come on occasionally [S. 59], and he talked indistinctly; pulse 100. *Ten and a half hours after bite on thumb and finger.*—SOPER, **C** 33, l. 19, p. 234.

59. Much pain in arm; and fits of fainting attacked him every fifteen minutes; during these the pulse was not perceptible; but during the intervals his spirits were less depressed [s. 33]. *Eight hours after bite on thumb and finger.*—SOPER, **C** 33, l. 13, p. 234, v, l. 149 *et seq.*

60. After walking five or six steps she fell down as if fainting. *Immediately after bite on toe.*—WOMAN, **C** 13, l. 6, p. 217.

61. He fainted several times, and became very pale. *Within first half hour after bite on finger.*—STEEL, **C** 22, l. 6, 10, p. 221.

62. Extreme sinking and faintness; he appeared to be dying. (He recovered.) *Five hours after bite on finger.*—STEEL, **C** 22, ll. 10, 12, p. 221.

63. Repeated faintings. *After a bite.*—SPIX, **C** 31, l. 3.

64. Rush of blood to head, with repeated faintings, and tremblings and convulsions of limbs. *After a bite.*—SPIX, **C** 31, l. 3, p. 233.

65. Several times on attempting to walk a few yards he was seized with nausea and vomiting. This continued for several days. *Twenty-four hours after bite on finger.*—WDS., **C** 23, ll. 11, 12, p. 222.

66. Whilst walking across floor was seized with general spasm, without foaming at mouth; it went off in a few minutes on being laid on floor.—*Eighteen hours after bite on arm.*—LAKE, **C** 26, l. 16, p. 225.

67. Immediate loss of sight and feeling of intoxication, with coldness and loss of power of extremities; lividity of countenance, lethargy, and imperceptible pulse. The lethargy was such that he had to be spoken to in a loud tone, but when roused he answered questions distinctly. In about half an hour the drowsiness and stupor decreased; slight warmth returned to the extremities, and slight pulse to the wrist. The next day the loss of sight was such that he complained of blindness, especially of right eye, of which conjunctiva was injected, and the cornea was surrounded by a red zone; the pupil was extremely contracted, and the aqueous humour appeared cloudy; the upper lid was paralysed. Even the sight of the left eye was indistinct, as if a film were interposed between it and the objects; its conjunctiva was somewhat congested, and a slight zone round its cornea, and its pupil was of a greyish colour. On the following day he could see a little with the right eye, and the amaurosis gradually passed off, so that vision and the natural appearance of the eyes had returned by the third day. *After a bite in the evening on right heel.*—FRANCISCO, **C** 6, p. 214.

67a. Three hours after a bite just above ankle the leg was found enormously swollen, and there were extreme nausea and frequent vomiting; the patient was covered with cold perspiration, and shivering like one in the cold stage of an intermittent; the countenance was anxious, the breathing hurried, pulse frequent and feeble; and an involuntary evacuation of urine every few minutes. Hot brandy toddy administered at very frequent intervals produced reaction within a few hours, and though the part sloughed the patient recovered in about a week.—MISS CASTEEL, **Ca**, 25*a*, l. 6—11, p. 224.

68. The animal became feeble, and reeled about as if giddy. *Within ten minutes after two bites.*—DOG, **Ca** 10, l. 4, p. 242.

69. Giddiness, turning round. *Two hours after bite.*—DOG, **Ca** 11, l. 5, p. 242.

70. The bitch suddenly staggered and fell on her side, then rose and again fell. *Half hour after two bites.*—DOG, **Ca** 9, l. 8, p. 241.

71. Howling and staggering; it then lay down on its side. *Soon after a bite.*—DOG, **Ca** 11, ll. 1, 4, p. 242.

72. Howled, shook, and fell down, and foamed at the mouth. *Immediately after bite on nose.*—DOG, **Ca** 13, l. 2, p. 243.

73. Rolled over, gasping and slightly convulsed, and was dead in one minute. *After bite on paw.*—RABBIT, **Ca** 25, p. 245.

74. After a few minutes, weakness, gritting of the teeth, and rapid respiration. Next day it passed some very albuminous urine, and a

large amount of blood mixed with the fæces. The symptoms of general weakness increased and the hind legs began to drag; the movements were uncertain, the bloody purging grew worse, and it died on the third day. *After bite on back.*—RABBIT, Ca 26, p. 245.

75. Weakness came on within two hours, and continued increasing; at the third hour he staggered in his gait, and at four and half hours he ceased to drink, and finally lay down; he then vomited a little food and mucus, and soon after purged and urinated. After this he gradually recovered. *After bite on thigh.*—DOG, Ca 4, ll. 4—10, p. 238.

76. Became rapidly weak, and within an hour and a half could not turn when laid on its back, and was unable to use its hind legs, and shortly afterwards it lost all voluntary power, even in fore-legs. *After bite on back.*—FROG, Ca 41, l 3, p. 248.

77. For five hours the frog remained in one position, quite motionless; bloody serum exuding from the wound. *After bite on thigh.*—FROG, Ca 39, p. 248.

78. Inert and sluggish. *Twenty-five hours after bite on back of pelvis.*—FROG, Ca 38, l. 1, p. 247.

79. Very sluggish. *After bite on thigh.*—FROG, Ca 40, l. 3, p. 248.

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Pathogenetic Commentary.

From the foregoing symptoms it is evident that Crotalus exerts a very rapid, direct, and depressing influence on the sensorium and medulla oblongata; deranging both their circulation and nutrition;

and thus interfering with the operation of all the senses. After death, in sub-acute and chronic cases, the cerebrum, cerebellum, and medulla are found in a state of engorgement, with dark, fluid, degraded blood, and apparently threatened with softening, v. S.S. 124—132. The most marked sensorial symptoms are: yawning, confusion, quietness, vertigo, paralysis, faintings (especially on attempting to walk) weakness, trembling, staggering, intoxication, lethargy, coma, grinding of the teeth, twitching, convulsions (epileptic, tetanoid), and nausea and vomiting. Many of these are purely "contingent," being altogether independent of the dose; though the "absolute" symptoms are more numerous, because of the few "provings;" and hence, also, the symptoms are more objective than subjective. These symptoms and post-mortem appearances strongly confirm the analogy, shown by the mental symptoms of Crotalus poisoning, to the zymotic, septic, and other toxæmiæ, v. § 10, p. 155.

Therapeutic Application.

In consequence of this profound and general action of Crotalus on the sensorium and medulla, its therapeutic sphere and usefulness in affections of the sensorium are extensive and important. They embrace, in fact, nearly all the morbid manifestations of the sensorial functions; especially when these are at all dependent upon zymotic, septic, or other toxæmic influence. Crotalus is, therefore, one of the most frequently indicated remedies in the treatment of vertigo, fainting, nausea, vomiting (when cerebral), trembling, convulsions, yawning and lethargy. [For Drowsiness, Coma and Delirium v. "Mind," p. 252; and for Headache v. "Head," p. 265]:

Vertigo.—1. **Cerebral.**—Dependent upon some morbid state of the substance of the sensorium, or medulla, or both: such as occurs in lightning-stroke, sun-stroke, and fright; and such as may be supposed to take place on the invasion in some cases of zymotic disease; and perhaps in epileptic vertigo, *petit mal*, &c. 2. **Vascular.**—*Hyperæmic.*—Venous congestion, especially with degraded blood, such as may be present in zymotic, septic, alcoholic, menstrual, bilious and albuminuric intoxication. *Anæmic.*—Cardiac, from debilitated, soft weak heart—the "essential vertigo" of Ramskill; when the brain is unnourished and there is accompanying palpitation, breathlessness, feeble pulse, and tendency to syncope. 3. **Nervous.**—Auditory vertigo, Meniere's disease, dependent upon some morbid condition of the auditory nerve, produced, perhaps, by pressure on the semicircular canals by fluid in the tympanum, v. Ss. 11, 49, 113.

Fainting; especially under the conditions mentioned under vascular vertigo.

Nausea and Vomiting, cerebral [for gastric and bilious vomiting v. "Stomach," p. 295], *i.e.* when not dependent upon the digestive organs, but upon the condition of the brain, blood, or heart; especially under the conditions noticed under vertigo; and particularly when they are provoked by rising from the recumbent or sitting posture or attempting

to stand or walk, as is frequently seen in zymotic, septic, menstrual, and albuminuric intoxication.

Yawning; especially when associated with oppressed nervous system, or degraded blood supply, *i.e.* when symptomatic of disease in some blood depurating organ, such as uterus, liver, kidneys; or with a weakened, softened heart.

Lethargy; especially under the conditions noticed under "vomiting" and "Yawning."

Trembling and Convulsions.—v. "Generalities," p. 371.

Clinical Experience.

There is not much recorded clinical experience of the treatment of sensorial disorders with Crotalus. The present writer has seen faintings, tremblings, vertigo, nausea, and vomiting, disappear under its use. The following case occurred in his practice:

Mr. W—, aged 23, weakly, strumous; lately married; very closely worked, and constantly exposed to the exhalations from leather; was attacked with dizziness, fainting and weakness, with occipital headache, several times a day. Crotalus 6, every two hours; after two days no return of the symptoms.

Further evidence in support of the curative power of Crotalus in sensorial disorders is afforded by the experience recorded with the more familiar and very similarly acting serpent venom, lachesis (v. *Jahr's New Manual*, ii, 27, 58; also *Brit. Journ. Hom.*, v. 403.

Dr. Bayes says: "In the 12th dil. I have seen lachesis of great service in arresting the tendency to fainting in nervous women. But the most decided and rapid beneficial action of lachesis which I have seen has occurred in the cure of the flushes of women at the critical age, and in cases where this leads to sleeplessness. In these cases my experience has shown me that the 6th and 12th dilutions have invariably been productive of great relief and rapid cure."—*Applied Homœopathy*, p. 109.

§ 3. Head Symptoms (80—132).

v. § 9, p. 154.

80. Slept heavily and dreamt much, and on awaking in the morning felt as if brain were contracted and lay loose within skull, and fell about on moving head, and as if it were tender or morbidly sensitive so that a pulsative headache was felt synchronous with the pulse, as if brain were somewhat grasped; also a tenderness of the heart on turning to lie on left side, as if pericardium were morbidly sensitive. These two symptoms continued for over an hour, and went away whilst dresssing. *First night after five doses of five drops each of 3rd dil.*—HAYWARD, **A** 3, l. 14, p. 196.

81. Sensation of swelling of velum, with feeling of mucus in fauces, which had to be swallowed down or hawked up, or as if uvula were hanging too low; followed by constant yawning and a downwards-

pulling pain in small spot in head at right side of vertex, and some sore pain about uvula on swallowing; and followed shortly by singing in whole head as after taking chloroform, continuing for some time, and being followed by a full congested feel of whole front part of brain; with torpidity of intellectual faculties, and dull compression in front of brain. These symptoms lasted all day, and only disappeared during the evening. *After 6th dose, ten drops, 3rd dil.*—HAYWARD, **A** 3, l. 24, p. 196.

82. Dull, heavy feeling in head.—SCHMÖLE, C.H. 185, **A** 1, p. 195.

83. Headache in whole forehead, which gradually became worse until at last it was unbearable; then again a little better, and continuing until evening. *After half an hour.*—SCHMÖLE, C. H. 152, **A** 1, p. 195.

84. Headache, which, though very bad indeed shortly before going to sleep, and especially on undressing, in the morning after a good night's sleep had vanished.—SCHMÖLE, C. H. 162, **A** 1, p. 195.

85. Pressing headache, with giddiness and sensation of discomfort on movement; the pain is worse over eyes, especially right one; it is not continuous, but in spasmodic paroxysms. KUMMER, C. H. 198, **A** 1, p. 195.

86. Pressing pain in head with malaise.—KUMMER, C. H. 189, **A** 1, p. 195.

87. Grasping pain at under surface of left frontal lobe of brain, for about a minute; followed by dull, heavy, congested feel of whole front of brain, lasting several minutes and recurring on intellectual exertion. It returned next day after another five drops. *Hour and half after five drops* 1^{x}.—HAYWARD, **A** 4, ll. 6, 17, p. 197.

88. After some facial pains, continued tearing pain in brain just above root of nose, with a confused muddled feeling; and on coughing front part of brain felt a jerk, as if it were tender. Returned in afternoon after another dose. *Twenty minutes after ten drops 1st dil.* —HAYWARD, **A** 2, ll. 8, 15, p. 196.

89. Vertigo, frontal headache; pain above eyes and in temples, worse on right side; with malaise, bilious vomiting, and a necessity to lie down; associated with constipation. Better after a walk in open air. C. H. **A** 1, p. 195.

90. Pressure in forehead, afterwards feeling of general illness. *After three hours.*—KUMMER, C. H. 195, **A** 1, p. 195.

91. Deeply seated pressure behind eyes, behind ears, and in nasal bones; so that it, with the pressure in the temples, makes him gnash his teeth together.—SCHMÖLE, C. H. 448, **A** 1, p. 195.

92. Tension and pressure above the eyes.—SCHMÖLE, C. H. 447, **A** 1, p. 195.

93. Pain in right orbit, and at right side of forehead. *Second day.*—MARTIN, **A** 8, l. 5, p. 199.

94. Suddenly a violent drawing pain from vertex to right eye, in the evening.—SCHMÖLE, C. H. 213, **A** 1, p. 195.

95. Heavy pain at back of orbit and at left eyebrow. *First day.*—MARTIN, **A** 8, l. 3, p. 199.

Pressing pain behind left orbit, slightly pulsative. *Ten minutes after sixth dose, ten drops, 3rd dil.*—HAYWARD, **A** 3, l. 22, p. 196.

97. A fine, pricking, stinging over left eye, as if from needle pricks.—SCHMÖLE, C. H. 422, A 1, p. 195.
98. Dull shootings in both temples.—SCHMÖLE, C. H. 243, A 1, p. 195.
99. Pressure in temples, especially left, which causes him to gnash his teeth together; with lightness in head.—SCHMÖLE, C. H. 203, A 1, p. 195.
100. Several times a drawing oppressive pain in right temple.—SCHMÖLE, C. H. 215, A 1, p. 195.
101. Shooting in left temple and whole left side of head, for five minutes after three-quarters of an hour.—SCHMÖLE, C. H. 241, A 1, p. 195.
102. Shootings momentarily in left temple.—SCHMÖLE, C. H. 242, A 1, p. 195.
103. Intense painless pulsations in temples.—LINGEN, C. H. 291, A 1, p. 195.
104. Twitching of muscles in temples.—LINGEN, C. H. 290, A 1, p. 195.
105. Headache and cold feet preceded by pain in hypo- and epi- gastrium (s. 242). The headache is in the vertex; pressive; comes on in afternoon, and lasts till night, for three days. On the fourth it changed to forenoon, with heat and flushing of face. An attack of diarrhœa now came on; after which the bowels were costive and evacuations hard, during a week. Anxious dreams: is drowsy and heavy in the evening; turns about very much in bed; is easily tired by slight exertion; the arms feel benumbed in the morning; the legs go to sleep and tingle when sitting; lips and throat dry, without thirst. *Eighth day after pilule of 4th dil., being fifth dose within nine days.*—S. E. S., A 7, l. 23, p. 199.
106. Shooting and rolling (swinging) in upper left side of head, especially on ascending stairs or walking fast.—SCHMÖLE, C. H. 182, A 1, p. 195.
107. Sensation of pain difficult to describe in right side, as if about to be afflicted with violent headache, without its coming to this. *After two hours.*—SCHMÖLE, C. H. 157, A 1, p. 195.
108. In left side of head several pains mixed up together, such as drawing, pressing, squeezing, splitting, and hammering, down to orbits and teeth.—SCHMÖLE, C. H. 159, A 1, p. 195.
109. Dull pain in occiput.—LINGEN, C. H., 173, A 1, p. 195.
110. Severe clawing pain in left side of cerebellum, lasting a few minutes. *Twenty minutes after five drops* 1ˣ.—HAYWARD, A 4, l. 2, p. 197.
111. Cold shivers over head causing hair to stand on end.—SCHMÖLE, C. H. 294, A 1, p. 195.
112. Violent itching of scalp and a quantity of scurf separated.—LINGEN, C. H. 299, A 1, p. 195.
113. After some topical inflammation (S. 556) followed by some disturbance of circulation (S. 391); after five hours, whilst sitting writing, sudden vertigo and nearly fell off chair. After another two hours a full congested feel in front of brain lasting some time. This was present again on awaking next—the second—morning along with an

aching pain especially over left eye; these two went away in about half an hour. Same symptoms on awaking on third day accompanied by sharp pain in small spot in centre of left occiput. These disappeared in about half an hour. The same heavy dull frontal headache was present on awaking on morning of fourth day, and went away after fifteen minutes; but was again present on awaking on morning of fifth day, but went away in ten minutes. During this—the fifth—day noticed myself making absurd mistakes in spelling, having to write very familiar words three times over; thinking of the proper letter but writing a wrong one; this continued all next—the sixth day; and for next two days was very languid and reluctant to rise, and hesitated to take my usual cold bath. *After rubbing a little venom into scratch on wrist.*—HAYWARD, **B** 1, ll. 23—29; 54—73, pp. 202, 203.

114. Along with severe giddiness (v. symp. 49), whilst sitting, heaviness of head came on as if head would tumble about, requiring hands to support it, relieved by laying head down and by night's rest; followed next morning by mental disturbance (S. 11), and in the evening by abdominal pain, as if spreading from abdomen up trunk to left cheek and temple as a sharp cutting intermittent neuralgic pain; and there was at the same time across middle of forehead a heavy, dull continued pain, accompanied by the mental dulness before described (v. S. 11). The sharp shooting in temple lasted about one hour, but the dull heavy frontal pain only disappeared on going to sleep. This dull frontal headache returned on the fourth evening afterwards, and again only went away during sleep.—E. D., **B** 2, l. 9—34, p. 204.

115. Headache, especially frontal, generally lasting twenty-one hours; want of appetite, thirst. *Fourteen hours after inoculation.*—MANZ, **B** 3 *a*, ll. 10, 36, 54.

116. Tremblings and convulsions of limbs, with rush of blood to head, and repeated faintings. *After a bite.*—SPIX, **C** 31, l. 3, p. 233.

117. Pain in whole head; great anxiety and uneasiness; violent thirst and diarrhœa; oppression of chest; and violent burning pain in trunk, increased by touch. *Fifteen minutes after bite on foot.*—WOMAN, **C** 12, l. 2, p. 217.

118. Violent pains in front part of head, followed by vomiting. *Five minutes after bite on toe.*—WOMAN, **C** 13, l. 9, p. 218.

119. All his hair fell off. *A few weeks after bite on heel.*—MR. B—, **C** 3, l. 10, p. 213.

120. Head hanging down a little. *During first half hour after two bites.*—DOG, **Ca** 9, l. 5, p. 241.

121. Slight general convulsions, with head thrown forwards and feet extended. *Five hours after bite on leg.*—RABBIT, **Ca** 28, l. 5, p. 246.

122. Much enfeebled and disposed to sleep shortly; and died in violent convulsions with the head thrown backwards, at the eighth hour. *After bite by exhausted snake.*—PIGEON, **Ca** 20, p. 244.

123. The head was suddenly bent forwards on the breast, and after three such convulsive movements it ceased to breath. *Forty minutes after being bitten by two snakes.*—PIGEON, **Ca** 16, l. 10, p. 243.

124. Slight congestion of brain and spinal cord, so that the section was just a little spotted; but the cerebral arachnoid was notably thicker and more tough than normally, and was too opaque; moreover it adhered to the pia mater, the meshes of which were distended with viscid serum. The membranous covering of the spinal cord, also, was more injected than in health. The basilar arteries contained some small clots, like those in the axillary vein and vena cava; but the blood was liquid in the cerebral sinuses and the vessels of the dura mater. *P.M.*—DRAKE, **C** 28, l. 95, p. 228.

125. Much fluid blood followed on cutting into the scalp, and still more from the sinuses of the brain, perhaps a pint. The arachnoid covering the hemispheres was raised into vesicles, by the deposit of serum beneath, giving it the appearance of a blister. The veins of the pia mater were much injected. The brain substance was much injected; and the cortical substance of a deep brown colour. Much serum issued from every cut made into the brain. The cerebellum also was injected. There was no extravasation. *P.M. four hours after death.*—LAKE, **C** 26, l. 3, p. 225.

126. Vessels of pia mater and brain were tinged with blood; the ventricles contained rather more water than is usual; and water was effused into the cells connecting pia mater and arachnoid. *P.M. sixteen hours after death from bite on hand.*—SOPER, **C** 33, l. 150, p. 237.

127. The sinuses of brain and the pia mater were filled with blood. P.M.—*Three hours after death.*—CHILD, **C** 27, l. 2, p. 226.

128. The vessels of the membranes of the brain made a most beautiful figure, from the quantity of blood contained in them; as did likewise the bloodvessels of the nerves. There was a small quantity of water between the hemispheres. *P.M. next day after death.*—DOG, **Ca** 13, l. 11, p. 243.

129. The brain was normally firm, though somewhat congested, and its vessels were distended with fluid blood and a few bubbles of gas. At the side of the long sinus a little blood seemed to have soaked through all the membranes to the bone. *P.M. twenty-four hours after death.*—DOG, **Ca** 7, l. 33, p. 241; see also *P.M.* DOG, **Ca** 8, l. 13, p. 241.

130. Patch of extravasation of blood under arachnoid. *P.M. quarter hour after death.*—DOG, **Ca** 11, l. 13, p. 242, C.H. 130.

131. There was slight superficial congestion of the brain; and out of one of the larger vessels in the cerebrum some blood flowed, which broke up into crystalline masses resembling hæmatin. *P.M. shortly after death in three minutes from bite on back of neck.*—GUINEA-PIG, **Ca** 24, l. 18, p. 245.

132. The brain was highly congested, and there was a good deal of bloody serum in the cavities of this organ. Similar congestion existed in the spinal canal; and at several points the white nervous tissue was stained with small patches of blood. *P.M.*—RABBIT, **Ca** 26, l. 15, p. 246.

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Pathogenetic Commentary.

The foregoing symptoms show very plainly that Crotalus affects directly and idiopathically the brain substance, and the vessels and membranes of the entire encephalon; perverting or arresting the cell action and nutrition, and the blood circulation. After death, in subacute and chronic cases, the brain and its membranes are found in a state of congestion, with dark, fluid, disorganised blood. The condition in the case of Adam Lake may be taken as an example: "Much fluid blood followed on cutting into the scalp, and still more from the sinuses of the brain perhaps nearly a pint. The arachnoid covering the hemispheres was raised into vesicles by the deposit of serum beneath, giving the appearance of blisters. The veins of the pia mater were much injected. The brain substance was much congested, and the cortical substance was of a deep brown colour. Much serum issued from every cut made into the brain. The cerebellum also was congested." From these post-mortem evidences it is not surprising that during life a feeling of congestion of the brain should be a very prominent symptom and headache should be very frequent and severe. Headache is, in fact, a very usual symptom; and it assumes almost every variety of pain; it is, however, mostly of a dull, heavy, pressing, compressive character: it is located especially in the front and particularly in the left lobe at its under surface, frequently involving the third convolution and disordering the faculty of language. It is especially apt to be present on awaking, particularly in the morning and on intellectual exertion, and it frequently occurs in small spots. The symptoms and post-mortem appearances very closely resemble those found in other toxæmiæ, such as zymotic and septic disease, v. Ss. 124—132, v. § 10, p. 155.

Therapeutic Application.

In consequence of this profound and disorganising action of Crotalus on the brain itself, the blood, and the vessels and membranes of the brain, the therapeutic sphere and usefulness of Crotalus in affections of the head are both extensive and important. There are, indeed, very few morbid states of the encephalon in which its exhibition would not be attended with benefit. It is especially useful, however, in the morbid states that arise from zymotic disease, septic poisoning, or other toxæmiæ, such as menstrual irregularities, albuminuria, jaundice, splenitis, angioleucitis, leucocythæmia, syphilis, scurvy, alcoholism, and the like.

The head affections most frequently calling for Crotalus are the following, viz.:

Convulsions; especially of an apoplectiform kind; and particularly if occurring at the onset of zymotic disease: under such circumstances Crotalus is, perhaps, one of the most thoroughly indicated medicines we possess. It is especially called for in puerperal women, and in children;

and particularly in convulsions resulting from the extension of disease of the ear after the exanthemata, and in whooping cough, v. Ss. 15, 21, 122, 660, 724, 729, 730, 737, 738.

Hydrocephaloid.—The spurious hydrocephalus which follows non-tubercular meningitis or convulsions, or other exhausting, or zymotic, or toxæmic disease, v. Ss. 124—132.

Headache; especially of a dull, heavy, aching, drawing, pressing, compressive, or pulsative character; or shooting, or stinging; which tends to be present on awaking in the morning, generally going off whilst dressing; also coming on after mental exertion, or accompanied by confusion and loss of memory, especially for words and figures; or by vertigo, nausea, vomiting, malaise. The frontal headache is located especially in the left anterior lobe, and more particularly at its under surface.

Cerebral Congestion.—Passive, either primary or secondary—especially if accompanied by severe headache, vertigo, nausea or vomiting; also the cerebral congestion accompanying the invasion of the zymotic or septic diseases, when otherwise we would think of cam.—opi.—nux.—cup.

Meningitis; especially secondary, such as that resulting from the extension of ear disease; toxæmic, alcoholic, albuminuric, scarlatinoid, varioloid; particularly at the period of effusion, when otherwise we would think of aps.—hel.—sul.

Cerebritis; especially alcoholic, or chronic, or accompanied by paralytic symptoms or mental deficiency, when otherwise we would think of iod.—plb.

Softening of the Brain; especially under the conditions mentioned under "cerebritis."

Apoplexy—either serous or hæmorrhagic—; especially in the threatening or incipient stage, and particularly when occurring in hæmorrhagic, or broken-down constitutions, or in drunkards, or in connection with any other toxæmic state. [For Paralysis, v. Generalities.]

Eruptions on the Scalp; pustules, boils, carbuncles, especially with a tendency to unhealthy, hæmorrhagic contents, or recurrent, or slow, or with œdematous surroundings, v. Ss. 7, 10, 11, 15, 17, 18, 20, 55, 67, 81, 87, 113, 124, 128, 131, 132, 148, 355, 722, 725, 742, 743, 744.

Falling off of the Hair; especially as a result of toxæmia, such as scarlatina, typhus, variola, &c., v. Ss. 119, 602.

Clinical Experience.

In many of these cases Crotalus has already proved curative; though the recorded experience with it in the treatment of head affections is yet only scanty. Dr. NEIDHARD has communicated the following cures: Lizzie V—, headache all over, with high fever, mostly at night, with great drowsiness, also heat in forehead and burning in chest, headache aggravated by motion. Cured with Crt. 2. Hannah H—, the mother of four children, had over three years throbbing and heat

in left side of head, with nausea, before menstruation. She sews much, and does housework; sometimes vomits green bile; urine high coloured during the attacks. Cured with Crt. 30. M. K—, very severe neuralgic pain in right eye and top of head, on the right side down back of neck, at intervals, for twenty years. Pressure and heavy pain on the top of the head from 6 a.m. until evening, for three days. Also some aching pain about right kidney and in stomach. Various remedies were prescribed, without benefit; but Crt. 200, entirely removed the neuralgia. A. A—, dull, heavy pain over eyes and in sides of nose, also dull pressing pain at back of ear, heat in forehead, lightness of head in the open air, nausea and vomiting, with nervousness and depression of spirits. Cured with Crt. 400. v. also *Jahr's New Manual*, i, 616.

Further evidence in support of the curative power of Crotalus in head affections is afforded by the many recorded cures with the more familiar and very similarly acting serpent venom, lachesis v. *Jahr's New Manual*, ii, 28, 29; also *Brit. Journ. Hom.*, v. 434, 403; also *Amer. Hom. Review*, 1863, 556. Dr. BLACK says lah. is the remedy for "one-sided headaches, attended often with sickness, vertigo, paleness, tendency to faint, general sensation of numbness." *Brit. Journ. Hom.*, v, 435; and Dr. R. HUGHES thinks the "nervous" and the "sick" headache are its spheres; the pain is unilateral, and the face pale: and that it is good for the burning vertex headaches of the menopausia. *Pharmacodynamics*, 602. The following case may be given as an example: Mr. W—, a wealthy farmer, æt. 60. Headache had troubled him ever since he was six years old; appearing every eight or ten days. The pain habitually began towards evening in the back of his head, at first dull and gradually concentrating with an acute boring sensation behind the left ear. When the boring pain reached its height, generally towards morning, vomiting of food and slime supervened, accompanied by stitches in the chest, which lasted for some hours, generally ended the attack, whereupon he felt sleepy and exhausted. . . . I gave lah. 30, four doses, one to be taken every other day. After thirteen days the patient came to report that he had had no headache at all since beginning the medicine; after another ten days he had a slight and short attack, without any nausea or vomiting; and after this he had very little return of headache" C. WESSELHOEFT, M.D., *Brit. Journ. Hom.*, xxii, 483. And yet further evidence is afforded by the recorded experience with the other very similarly acting serpent venom, naja, of which Dr. RUTHERFORD RUSSELL says: "For many headaches it will be found specific, especially those attended by coldness of the feet and flushes of the face, with weight and pressure at the vertex, and when the pain is very acute, of a neuralgic character" *Annals of Brit. Hom. Society*, i, 304. The following case will serve as an example: "Mr. A—, æt. 27, complained for a long time of chronic headaches; awakes with one every morning; dull heavy constriction across forehead; eyes sunk and dark; incapacity for much exertion of mind or body; headache sometimes wears off, at other times continues all day; he has also constant relaxed sorethroat, dryness of fauces, hoarseness; very susceptible of cold; had frequent emissions. I gave him one grain of naja 2 every night for a week. Two or three mornings had no headache; has been almost free ever since, now six weeks, throat almost well, says no remedy ever did him so much good."—R. RUSSELL, *Brit. Journ. Hom.* xii, 214.

§ 4. Eye Symptoms (133—155).

v. § 9, p. 154.

133. Pressing pain in eyeball on moving eyes, as if orbits were dry inside.—SCHMÖLE, C. H. 443, **A** 1, p. 195.

134. Dusky redness of left upper lid, with dryness and burning of inside of eye and redness of angle.—SCHMÖLE, C. H. 429, **A** 1, p. 195.

135. Itching in the angles of eyes.—LINGEN, C. H. 419, **A** 1, p. 195.

136. After some cerebral symptoms (v. Symp. 80), dimness of vision, especially for distant objects; could scarcely recognise face of friends across street. This recurred next day after another five drops with illusion of vision (v. Symp., 116). *During afternoon and evening after five drops* 1^{x} *taken* 8.45 *a.m.*—HAYWARD, **A** 4, l. 12, p. 197.

137. Sneezing and nasal catarrh, with dimness of sight when reading, and as if the letters had a reflection beneath, making them appear double, one half beneath the other. *During forenoon of second day after one dose of five drops of* 1^{x} *each morning.*—HAYWARD, **A** 4, l. 17, p. 197.

138. Fading of sight by reading.—SCHMÖLE, C. H. 521, **A** 1, p. 195.

139. Eyes half open and staring; and eyes and ears insensible to impressions. *Ten minutes after bite on cheek.*—CHILD, **C** 27, l. 6, p. 226.

140. Eyes as if shooting from their sockets. *Shortly after bite on foot.*—MAN, **C** 17, p. 220.

141. Eyes sunk, and almost extinguished, with swollen discoloured face. *After a bite.*—SPIX, **C** 31, l. 2, p. 233.

142. Eyes red and firy, continuing so for two days. *Ten hours after bite on finger.*—BURNE, **C** 15, ll. 6, 9, p. 218.

143. Red, watery, tearful eyes; and dryness of throat with violent thirst. *One hour after bite on toe.*—WOMAN, **C** 13, l. 12, p. 218.

144. Eyes muddy and heavy, and face somewhat bloated. *Eighteen hours after bite on arm.*—LAKE, **C** 26, l. 14, p 225.

145. He became very agitated, anxious and pale; and a cold sweat bathed his face and chest, and his eyes expressed anxiety. *A few minutes after two bites on hand.*—DRAKE, **C** 28, l. 5, p. 226.

146. The eyes were weeping blood and the gums bleeding: the blood appeared so thin as to ooze from the vessels. *A few minutes after bite.*—BOY, **C** 4, l. 2, p. 213.

147. Blood issues from eyes, nose, and ears; and with the matter vomited. *After a bite.*—SPIX, **C** 31, l. 4, p. 233.

148. Immediate loss of sight, and a feeling of intoxication (l. 4), with lethargy and lividity of countenance (l. 13), cold extremities and loss of pulse (l. 24). After some hours blindness of right eye (l. 57 *et seq.*), and dimness of sight of left; injection of conjunctivæ, with red zone round cornea, right eye the worse; pupil of right eye extremely contracted; pupil of left greyish; paralysis of upper lid of right eye. Sight began to return on second day; and had quite recovered by the fourth. *After a bite on heel.*—FRANCISCO, **C** 6, p. 215.

149. "The lad was delirious; his hearing was dull, his eyes were closed—upper lids and superior recti paralysed—the pupils were slightly dilated and were insensible to light, and vision was apparently lost. The eyes looked straight forwards, but on forcibly opening the lids the eyes were directed outwards to escape the light, not, as usually, upwards." The pulse, respiration, and temperature were much affected, and there were thirst, vomiting and purging. Under stimulants, reaction set in and these symptoms passed off within a

few hours (l. 61). *Three hours after a bite on hand.*—JEF. C 30*a*, l. 15, p. 232.

150. Along with illusions of hearing (v. S. 140); pupils dilated, and she could not see, declaring it was dark and that candles were lighted in the room [recovered under whiskey and ammonia]. *Two and a half hours after bite on instep.*—MISS R—, C 5, l. 6, p. 213.

151. Blindness and universal pain. *Fifteen minutes after bite on heel.*—Mr. B—, C 3, l. 4, p. 212.

152. Pupils contracted during early effects (l. 10) [during convulsive stage] but dilated during later (l. 17) [prostration stage]. *After a second bite—in neck.*—DOG, Ca 7, p. 240.

153. Heart very feeble, breathing laborious, pupils contracted. *Five minutes after a second bite—in neck.*—DOG, Ca 7, l. 10, p. 240.

154. Pupils gradually contracted before death, and suddenly dilated afterwards. *Five and a half hours after bite.*—PIGEON, Ca 21, l. 7, p. 244.

155. The pupils were contracted, the eyes half closed, and the lids of the right one completely insensible, of the left one nearly so. *After a bite on back.*—FROG, Ca 41, l. 5, p. 248.

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Pathogenetic Commentary.

From the above symptoms—many of which are "contingent," being altogether independent of the dose—it is evident that Crotalus affects profoundly the organs of vision, even to the extent of annihilating

their functions. The subjective dryness with burning heat, and the objective redness with zone round the cornea, and the disordered state of the pupil, point to irritation or inflammation of the conjunctiva, sclerotic and iris; and the congestion, ecchymosis and hæmorrhage show that the disorganising effect on the blood and blood-vessels generally extends to those of the optic apparatus; whilst the cloudy appearance of the aqueous humour, the grey appearance through the pupil, the amaurosis and perverted vision, and the blindness, show the topical action on the internal structures of the globe, and perhaps on the optic nerve at its origin. The totality of the symptoms points to a congested, softened state, as of threatened disorganisation, a state not unlike that found in severe cases of zymotic, alcoholic and other intoxications; and such as might be expected from the general action of the drug. v. § 10, p. 155.

Therapeutic Application.

This irritant, disorganising action on perhaps all the structures of the optic apparatus, bespeaks for Crotalus a wide range of usefulness in the treatment of diseases of the eye and its appendages; especially in debilitated, degraded states of the system, or as accompaniments or sequelæ of septic, zymotic, or other toxæmiæ such as albuminuria, jaundice, menorrhagia, menopausia, &c.

The special diseases in which it is most plainly indicated are:

Blepharitis.—Inflammation of the lids; especially when of an erysipelatous character, and when occurring in the course of the septic or zymotic diseases.

Œdema of, or Hæmorrhage into, Eyelids; especially under the conditions mentioned under "blepharitis."

Ophthalmia, Conjunctivitis, Iritis, &c., especially as occurring in the eruptive diseases, variola, morbilli and syphilis, or other blood disease.

Ecchymosis, Chemosis, Conjunctival Hæmorrhage; especially occurring in the course of zymotic disease, menstrual irregularities, and in hæmorrhagic states of the body.

Retinal Hæmorrhage; especially if a part of a hæmorrhagic constitution, or in connection with heart, or kidney, or uterine disease.

Retinal Hyperæsthesia; especially in debilitated, broken-down, strumous, and hæmorrhagic constitutions.

Retinitis; especially albuminuric and syphilitic.

Ambliopia, Amaurosis; especially from hæmorrhage, debility and exhaustion, S. 148.

Diplopia, Glaucoma, &c.; under similar conditions, v. Ss. 137, 139, 144, 148.

Dimness, Loss of, Illusions of, Vision; under similar conditions, S. 136.

Paralysis of Ocular Muscles; under similar conditions, v. Ss. 148, 67.

Ptosis; under similar conditions.

Clinical Experience.

Clinical experience with Crotalus has not yet furnished many cases of cure of diseases of the eye, though single symptoms have frequently disappeared during its use, v. *Jahr's New Manual*, 1, 616. The following case occurred in the practice of the present writer: Miss R—, aged 33, very weak and low after much nursing, and the loss of her mother; and some years previously some syphilitic infection with re-vaccination, got her clothes damped, followed by catarrh, which she treated with acon. and dulc.; but the eyes remained weak and very red, with mattering and sticking together of the lids; the sight was very weak, and there was much photophobia. Crt. 6, every two hours; and the eyes were well within three days. Dr. NEIDHARD has furnished the following case: "Periodical pain for more than a week, lasting the whole day, as if the left eye was pulled out; at the same time dimness of sight, can only read large print: left lobe of brain affected. This patient was addicted to drinking and smoking and once had syphilis. Cured with Crt. 3 and 6." Drs. ALLEN and NORTON write: "NUNEZ advises the use of this remedy for clearing up the vision after an attack of keratitis or kerato-iritis. DÉCRAN used it with benefit in a case of ciliary neuralgia in a woman, aged 25, who for two months had complained of tearing, boring pain, as if a cut had been made around the eye, sometimes sticking in character, and worse morning and evening; great sensitiveness to light, especially lamp light; lids swollen in the morning, and pains in the forehead and occiput; palpitation of heart, especially at menstrual periods. Also in another case of amblyopia, caused from grief and over use of the eyes in sewing; cutting pains around the eyes were present, as well as muscæ volitantes and various coloured flames before the vision. Another great use of Crotalus, in common with the other snake poisons, as suggested by Dr. LIEBOLD, is to be found in hæmorrhages into the retina, whether occurring during the course of retinitis albuminurica or other diseases, or when it seems to be of spontaneous origin. It has not, as yet, been used as extensively as lachesis in this condition, though it no doubt has similar properties."—*Ophthalmic Therapeutics*, p. 55. Dr. H. GOULON mentions: "A neuralgic affection of the eye, with tearing, boring pain, 'as if a cut was made round the eye;' great sensitiveness to candle-light, and the eyes swollen in the morning. Pain in forehead and occiput had preceded the more recent eye pains. Crotalus $\frac{3}{4}$ removed the neuralgia in a few days."—*Brit. Jour. Hom.*, xxxiv, 467.

Further evidence in support of the curative power of Crotalus in diseases of the eye is afforded by the repeated cures performed with the more familiar and very similarly-acting serpent venom, lachesis, v. *Jahr's New Manual*, ii, 30. There is a severe case of ophthalmia related by Dr. DUDGEON as having been cured by Dr. MALAISE, in which he says: "lachesis was followed by truly marvellous effects," *Brit. Jour. Hom.*, vi, 481. Dr. SCHELLHAMMER relates a case of fistula lachrymalis cured in two weeks by lah., which was accompanied by a long-standing eruption on the face, *Archiv* 30, 3, 180, and *Amer. Hom. Rev.*, 1863, p. 557. And still further evidence is afforded by the cures performed by the other very similarly-acting serpent venom, naja; of which Dr. RUTHERFORD RUSSELL says: "Cobra does good in

passive congestion of the palpebral conjunctiva, when the lids look bluish, and are stuck together with gum in the morning," *Brit. Jour. Hom.*, xi, 598. And yet further evidence is afforded by the cures with the other serpent venom, Elaps, which, according to Dr. DECRAN, "appears to be especially curative in paralysis of the nerves of the organs of the senses, with accompanying hyperæsthesia of the trigeminus (chronic headache), which must be of great importance in the innumerable cases of dysecoia dependent on paralytic states of the auditory nerves. A man who was amaurotic in the left eye for three years, now got blind in the right eye also (everything appeared to him white, even at night: he could scarcely distinguish between light and dark); he likewise complained of violent headache, with drawing, sometimes shooting, pains from forehead to occiput. He was completely cured of his headache by elaps, and of the amaurosis so far as to be able to resume his work. A rheumatic diathesis was evidently present in this case, and in many others cured by elaps." *Brit. Jour. Hom.*, xxxiv, 467.

§ 5. Ear Symptoms (156—164).

v. § 9, p. 154.

156. Sensation as if right ear were stopped up and a drawing in interior of both ears, worse in right, with heat and a sensation as if ear-wax were passing through Eustachian tubes into mouth.—SCHMÖLE, C. H. 561, **A** 1, p. 195.

157. Hot, tingling sensation, as if from ear wax, in both ears.—SCHMÖLE, C. H. 540, **A** 1, p. 195.

158. Painful drawing in right ear, with sensation of heat in it.—SCHMÖLE, C. H. 545, **A** 1, p. 195.

159. Heat in right ear and bruised feeling in lobes.—SCHMÖLE, C. H. 541, **A** 1, p. 195.

160. Drawing in right ear, with painfulness of whole left side of head and a paralysed feeling in left jaw bone.—SCHMÖLE, C. H. 544, **A** 1, p. 195.

160 *a*. Along with great irritability of temper (S. 6*a*) and various hæmorrhages (S. 390*a*). She was very sensitive to noises, such as crumpling of paper and slamming of doors. *Whilst taking* 1^{x} *three drops four times a day.*—MRS. B—, **A** 6 *b*, l. 11.

161. During the evening noticed frequent tickling deep in right meatus auditorius. 6th evening after envenomed scratch on wrist.—HAYWARD, **B** 1, l. 75, p. 204.

162. Blood issues from ears, eyes and nose; and from stomach with the matter vomited. *After a bite.*—SPIX, **C** 31, l. 4, p. 233.

163. Along with illusions of sight (v. S. 150). Asked frequently if it were not raining, although the evening was calm and clear [recovered under whiskey and ammonia]. *Two and a half hours after bite on instep.*—MISS R—, **C** 5, l. 8, p. 213.

164. Ears insensible to impressions, and eyes also. *Ten minutes after bite on cheek.*—CHILD, **C** 27, l. 9, p. 226.

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Pathogenetic Commentary.

From the above symptoms, many of which are contingent, it is evident that Crotalus has an idiopathic effect on the organs of hearing, even to the extent of annihilating their functions. The subjective heat, pricking, tingling, stopped up feeling and pain, with the objective hæmorrhage, show an irritating and disorganising action on the middle ear; whilst the sensitiveness to noise and the deafness, taken along with the almost ever-present vertigo, point to a topical action on the structures of the internal ear and on the auditory nerve itself at its distribution, and perhaps also at its origin.

v. § 10, p. 155.

Therapeutic Application.

Bearing in mind the toxæmic character of the general action of Crotalus, the diseases of the ear in which it is more plainly indicated are the following, viz.:

Deafness; especially from hæmorrhage, or from humour or effusion in the middle ear, as in the exanthemata, menstrual irregularities, alcoholism, albuminuria, naso-pharyngeal catarrh; or remaining after morbilli, scarlatina, variola, diphtheria, typhoid, syphilis, &c. Dr. Jousset speaks highly of the serpent venoms in purely "nervous deafness."

Illusions of Hearing; especially under the conditions named under "deafness."

Auditory Vertigo, Menière's Disease; under the above-named conditions. v. "Sensorium," p. 259.

Otorrhœa; under the above-named conditions.

Erysipelas of External Ear; especially in broken down, or hæmorrhagic constitutions; or under the above-named conditions.

Abscess and Furuncle in Meatus, or External Ear, Frostbite, and similar affections.

Clinical Experience.

There has not yet been recorded much clinical experience with Crotalus in the treatment of diseases of the ear. The following case occurred in the practice of the present writer:—W. G—, aged 7½ years, of weakly constitution and eruptive skin, and whose father died of heart disease and alcoholism, had rather severe scarlatina under domestic treatment, followed by severe otorrhœa, which after three

months became sanguinolent and offensive, accompanied by considerable deafness, and then the writer was consulted. *Crt.* 6 was ordered three times a day, and the ear to be syringed with warm water having in it a few drops of *Crt.* 3. Quite cured within two weeks.

Further evidence in support of the homœopathicity of Crotalus in diseases of the ear is afforded by the cures with the other very similarly acting serpent venom, lachesis; v. *Jahr's New Manual*, ii, 31. Dr. CONSTANTINE HERING relates a case where, after otorrhœa, the right ear remained dry and obstructed, with almost entire deafness; cured by lah. in one week. *Allgem. Hom. Zeitung*, 41, 227. Also with elaps, of which Dr. H. GOULLON says: "As regards aural diseases cured by elaps, we find them frequently along with or after otorrhœa, and the discharge, when it is present, is seen to disappear with the other symptoms." *Brit. Journ. Hom.*, xxxiv, 467.

§ 6. **Nose Symptoms (165—169).**

v. § 9, p. 154.

165. When out of doors in forenoon, much yawning and sneezing, and much increase of secretion of watery mucus from nose. These somewhat remitted on returning into house; but returned when out in afternoon, accompanied by some stinging in nostrils; and continued all evening. *After 11th dose, twenty drops, 3rd dil.*—HAYWARD, **A** 3, l. 38, p. 197.

166. A little clear blood from nose.—LINGEN, **C. H.** 613, **A** 1, p. 195.

167. Flushed face, quick pulse, continued bleeding from nose. *Three and a half hours after bite on hand.*—MACH., **C** 29, l. 37, 40, p. 229.

168. Blood issues from nose, eyes and ears; and from stomach with the matter vomited. *After a bite.*—SPIX, **C** 31, l. 4, p. 233.

169. From nostrils and mouth a clear mucous discharge ran down: the submaxillary, parotid, and all the glands about head and neck were greatly enlarged. The eyes were glairy and the pupils much dilated. And the coat was rough and staring. *A few hours after a bite.*—**Ca** 22, l. 3, p. 244.

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Pathogenetic Commentary.

The sneezing and tickling point to the early stage of congestion of the schneiderian membrane, and the watery, mucous and sanguinolent discharge indicate the later stage; whilst the hæmorrhage shows the disorganising effect of Crotalus on the blood and blood-vessels of the nose. These symptoms appear, however, to be rather a part of the

general blood-poisoning and degradation of the mucous membrane, blood-vessels, and blood than any idiopathic action on the nose itself, except as a part of the respiratory organs.

v. § 10, p. 155.

Therapeutic Application.

Bearing in mind, however, the toxæmic character of the general action of Crotalus, the diseases of the nose for which it is more plainly indicated are the following, viz.: .

Epistaxis; especially at the onset, during the course, or towards the termination of the zymotic and septic diseases, or the other toxæmiæ, such as menstrual irregularities, liver disease, albuminuria; or in broken down constitutions, or depraved states of the blood, and where the blood appears thin, degraded, uncoagulable, dark; also with flushes of the face, or vertigo, or fainting.

Catarrh; asthenic, or influenzal; especially with sanguinolent discharge, in poor broken-down constitutions, or at the onset of morbilli.

Ozæna; especially left by the exanthemata or syphilis, and when the discharge is sanguinolent rather than offensive.

Redness and Blueness of Point; especially with swelling and coldness, and in old inebriates.

Erysipelas; in unhealthy constitutions, or spreading from unhealthy abscess, or connected with ozæna.

Clinical Experience.

Clinical experience has not yet furnished many cures of these diseases with Crotalus. The present writer cured a case of *Syphilitic Ozæna* with *Crt.* 6. v. Upper Extremities, Clinical Experience; Mrs. J—, and Dr. HERBERT NANKIVELL says he has frequently cured ozæna with it.

A clinical warranty for the use of Crotalus in these affections is afforded by the cures with the very similarly acting serpent venom, lachesis (v. *Jahr's New Manual*, ii, 31). ROSENBERG, 17 and 20, says lah. has cured *Redness* of the nose in drunkards; and internal *Soreness* of the nose when the nose was full of scabs; and when, in mercurio-syphilitic cases, much pus, mixed with blood, was discharged from the nose. *Amer. Hom. Rev.*, 1863, 557. And Dr. A. C. Clifton has recorded several cases of *Chronic Inflammation* of the nasal and pharyngeal lining, in which elaps—another very similarly acting serpent venom—was curative. *Hughes's Pharmacodyn.*, p. 608.

§ 7. Face and Neck Symptoms (170—191*b*).

v. § 9, p. 154.

170. Sharp downwards—drawing pain on right side of nose near inner canthus, lasting about a minute and gradually changing to a dull

bruised pain, lasting ten minutes and passing off gradually. Then followed a tearing pain in brain (v. symp. 88). At same time a slight quivering feeling in lower lip, near left corner of mouth, lasting a minute; and after another dose a quivering in left under eyelid, for a minute. *Ten minutes after ten drops 1st dil.*—HAYWARD, **A** 2, ll. 3, 14, p. 196.

171. Pressing drawing pains first in right jaw bone and then in left, and then both together.—SCHMÖLE, C. H. 397, **A** 1, p. 195.

172. A large pustule near left wing of nose, with drawing pain round about in the cheek, and a redness and hardness of the place, which continued a long time.—LINGEN, C. H. 386, **A** 1, p. 195.

173. Quivering of left under eyelid, for a few minutes. *Fifteen minutes after second dose of ten drops 1st dil.*—HAYWARD, **A** 2, l. 12, p. 196.

174. From behind right ear a drawing pain down neck.—SCHMÖLE, C. H. 528, **A** 1, p. 195.

175. Bruised sensation of anterior right lower jaw and teeth.—SCHMÖLE, C. H. 658, **A** 1, p. 195.

176. Larynx painful on being touched; second day.—SCHMÖLE, C. H. 930, **A** 1, p. 195.

177. Drawing tearing pain from right shoulder up side of neck, as if the muscle were stretched from shoulder blade to neck and someone were tearing it out, aggravated by moving arm backwards.—SCHMÖLE, C. H. 947, **A** 1, p. 195.

178. In left side of neck posteriorly a rheumatic drawing pain, as far as the shoulder.—SCHMÖLE, C. H. 946, **A** 1, p. 195.

179. After sixteen hours flushed face, injected conjunctivæ, epiphora; after twenty hours bitter taste, drowsiness, coryza and œdema of face; after twenty-three hours yellow jaundice, and after twenty-eight hours yellowness of sclerotic coat of eyes and shivering; after thirty-six hours œdema of eyelids; and after seventy-two hours swelling of lower lip. *After inoculation.*—MANZ, **B** 3*a*, ll. 11, 17, 20, 24, 55, 57, 65.

180. "The countenance expressed calm indifference with marked prostration and apparent freedom from suffering; the lips and cheeks were of their normal colour." The eyes were closed, upper lids and superior recti were paralysed. There were also delirium, with drowsiness; occasional restlessness and twitching; and the heart, respiration, and temperature were much affected; and there were vomiting and purging. *Three hours after a bite on hand.*—JEF., **C** 30*a*, l. 20, p. 232.

181. Face flushed and manner excited. *Three hours after bite on finger.*—WAINWRIGHT, **C** 30, l. 23, p. 231.

182. Countenance deathly pale. *Ten minutes after bite on cheek.*—CHILD, **C** 27, l. 6, p. 226.

183. He became very agitated, anxious and pale; a cold sweat bathed his face and chest, and his eyes expressed anxiety. *A few minutes after two bites on hand.*—DRAKE, **C** 28, l. 3, p. 226.

184. Face swollen, with besotted expression; removed by whiskey and ammonia. *Two and half hours after bite on instep.*—MISS R—, **C** 5, l. 5, p. 213.

185. Head and face prodigiously swollen, and the latter black. His tongue was proportionately enlarged, and protruded out of the mouth. His eyes were as if shooting from their sockets. His senses were gone. And there was every appearance of immediate suffocation. *Shortly after bite on foot.*—MAN, C 17, p. 220.

186. Face discoloured; eyes sunk and almost extinguished. *After a bite.*—SPIX, C 31, l. 2, p. 233.

187. Sensation of fulness in course of jugular veins, extending over sides and back of neck; some alteration in vision, and some formication in skin of face. *One hour after bite on hand.*—MACH., C 29, ll. 20, 21, p. 229.

188. Lower lip much swollen, and inflamed for some hours after bite on hand.—MACH., C 29, l. 85, p. 230.

189. He was low and depressed; there was a tremulous motion of his lips; and the faintings recurred at nearly the same intervals as the preceding evening [every fifteen minutes]. *Seventeen hours after bite on thumb and finger.*—SOPER, C 33, l. 31, p. 234.

190. Parts under jaws and about throat very much tumefied. *Shortly after bite on another part of body.*—ESSEN, C 10, l. 12, p. 217.

191. Submaxillary, parotid, and all the glands about head and neck, greatly enlarged; and from the nostrils and mouth a clear mucous discharge ran down. The eyes were glaring, and the pupils greatly dilated. And the coat was rough and staring. *A few hours after a bite.*—TWO HORSES, Ca 22, l. 3, p. 244.

191*a*. Face much bloated; and neck tumid and purple. *P.M. four hours after death from bite on arm.*—LAKE, C 26, l. 24, p. 225.

191*b*. The child's face was of a light saffron colour, and the ears, the hand and right arm were livid. *P.M. eight hours after death, after twenty-nine hours, from bite on right hand.*—JEF., C 30*a*, l. 79.

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Pathogenetic Commentary.

The "absolute" face symptoms of Crotalus are mainly evidences of general and profound blood-poisoning, such as occurs in zymotic and septic diseases and other toxæmiæ. The livid, bloated, besotted countenance; the cold sweat and formication, and the trembling and quivering of the lips and eyelids, taken in connection with the embarrassed respiration and heart's action are very analogous to the symptoms occurring in zymotic and alcoholic poisonings, and in asthma. The deathlike pallor, the blueness round and the sunken eyes, the cold sweat and the drawn countenance are very indicative of failure of the heart and of the nervous centres similar to what occurs in malignant cholera and old intermittents; and, taken in connection with the yellowness sometimes present, of acute liver disease and jaundice, and perhaps albuminuria. The puffiness at the angles of the lower jaw; the swollen submaxillary, parotid and cervical glands, especially taken in connection with the swollen and bloated, or the deathlike pale face, speak of profound degradation of the blood and vitality, similar to the later stages of the eruptive fevers, such as scarlatina, variola, morbilli, diphtheria, &c.

The "contingent" face symptoms are indicative of perversion of the sensory and motor nerves analogous to what occurs in debility, exhaustion, blood-degradation and anæmia, and they point to neuralgia, faceache, tic, convulsions, epilepsy.

v. § 10, p. 155.

Therapeutic Application.

The special diseases of the face in which Crotalus is more plainly indicated are:

Erysipelas; especially in the course of zymotic or septic disease, or other unhealthy state of the blood such as exists in diabetes, in the furuncular state, in old inebriates, in albuminuria, liver disease, menstrual irregularities, &c.

Acne; in all its varieties; especially tubercular, pustular, hæmorrhagic, and particularly when occurring in debilitated constitutions, as masturbators; or with degraded blood, as in drunkards; and after toxæmic diseases.

Discoloration, Blueness, Varicosis, &c., of nose, lips, &c., especially under the above conditions, and in heart disease, or asthma.

Neuralgia; especially of a dull character, or chronic, or periodic; and under the conditions above named.

Mumps; when occurring in toxæmic states of the system.

Clinical Experience.

There is not much recorded clinical experience with Crotalus in these diseases. *Erysipelas* and *Acne* of the face have been cured with it, as well as *Distended Red Face* with delirium tremens and fever, v. *Jahr's New Manual*, i, 616. And the following cases have occurred in the practice of the present writer. *Papular Eruption.*—Miss M—, aged 27, subject to chronic headaches, but most concerned about a copious red, itching, papular eruption on face, especially chin, which has existed for some months since menstruation has been delayed, scanty and dark; and especially since last period, now seven weeks ago. *Crt.* 6, four times a day. The eruption became less red within a few days, and menstruation returned within a week, and was more copious and of a better colour. *Crt.* continued three times a day. The eruption gradually decreased; and the next menstruation returned at the end of four weeks; after this the face was soon free of eruption. *Distortion.*—January 13th, 1883, Miss K—, aged 25, of dirty yellow, bilious appearance, subject to severe "bilious" headaches every few days, beginning behind left ear and passing round lower forehead as a pressing down on the eyes, attended with nausea and vomiting; bowels irregular, either diarrhœa or constipation. For years subject to grinding her teeth during sleep at night, so dreadfully that she has broken most of her molars; she wakes up with it nearly every night, and then finds her face much distorted—the mouth and nose drawn towards left side. [Belongs to an epileptic family.] She is incapacitated for her duties in a shop. Menstruation is always late—6 to 8 weeks' interval—scanty and lasting only three days, and dark in colour; very painful on beginning. *Crt.* 6, four times a day. January 18th.—Reports that on third day after beginning the medicine she had an attack of headache, beginning in a small spot behind left ear, and lasting twenty-four hours: it was the worst she ever had, so dreadful that she had to remain in bed for twenty-four hours, and there was much vomiting of greenish mucus: after this she felt much better; and last night had very little grinding of the teeth and very little distortion of face; but on pressure with finger (now) on left occiput pain shoots over left eye. Continue *Crt.* Menstruation occurred on January 22nd, and lasted four days, was less scanty, less dark in colour, and much less painful. She had had only one attack of headache, and that was very slight and unaccompanied with nausea or vomiting; she had slept much better, and there had been scarcely any grinding of the teeth, and no distortion of the face. Continue *Crt.* night and morning. After seven months she reported herself as having been quite well for the last seven months, and her countenance is much less unhealthy.

The more familiar and very similarly acting serpent venom, lachesis, has been found very useful in many of the above-named affections; especially erysipelas, prosopalgia, swellings, eruptions, jaundiced appearance, itching, &c. (v. *Jahr's New Manual*, ii. 32).

§ 8. Symptoms of Mouth, Tongue, Teeth and Gums (192—213).

v. § 9, p. 154.

192. Sour taste in mouth after an ordinary breakfast.—SCHMÖLE, C. H. 1018, **A** 1, p. 195.

193. Tickling on palate and fauces.—LINGEN, C. H. 817, **A** 1, p. 195.

194. Stomach sore and tender on rising in the morning; tongue red and sore; gums white; lips and throat dry, with thirst. *Third morning after taking one-drop doses 3rd dil. ter die.*—S. E. S., **A** 7, l. 9, p. 199.

195. Crushed sensation of entire right lower jaw, together with the teeth.—SCHMÖLE, C. H. 658, **A** 1, p. 195.

196. Transient violent shooting downwards, almost like a blow, in upper molar: second day.—SCHMÖLE, C. H. 756, **A** 1, p. 195.

197. Sudden transient pain in a right lower molar shooting up and down in it for a few times: first day.—SCHMÖLE, C. H. 755, **A** 1, p. 195.

198. After eighteen hours, gums swollen and painful, and the margins round teeth reddened; pain in salivary glands and in the direction of the different nervous branches of face and teeth; after nineteen hours, pains in lower jaw and in the direction of submaxillary nerve, lassitude; and after twenty-four hours, hæmorrhage from the gums. *After inoculation.*—MANZ, **B** 3 *a*, l. 12, 17, 21, 42, 56, 58, 60, 63, p. 205.

199. Taste for salt blunted: he drank a glass of salt and water but did not taste it salt. *A few hours after bite on palm.*—SHIPMAN, **C** 8, l. 13, p. 216.

200. Mouth covered with foam; eyes half open and staring; eyes and ears insensible to impressions. *Ten minutes after bite on cheek.*—CHILD, **C** 27, l. 5, p. 226.

201. Tongue and lips stiff and numb. *A few minutes after sucking a bite on his hand.*—BNTL, **C** 16, l. 4, p. 219.

202. Tongue and lips swollen, though not very painful. *About eight hours after sucking bite on hand.*—BNTL, **C** 16, l. 22, p. 219.

203. Pain in shoulder; upper lips swollen; tongue yellowish, but not swollen. *Five and a half hours after two bites on left hand.*—DRAKE, **C** 28, ll. 43-50, 58, p. 227.

204. Tongue very much swollen, and protruded from mouth. *Shortly after bite on foot.*—MAN, **C** 17, p. 220.

205. Sensation as if tongue and all round his throat were so tied up that he could not speak. *Immediately after bite.*—ESSEN, **C** 10, l. 19, p. 217.

206. Tongue swollen to nearly double its normal size; and several bloody stools. *Second day after bite on hand.*—IRISHMAN, v. S. 297, **C** 7, l. 15, p. 215.

207. Dry tongue and incessant thirst, with dry consuming fever. *After a bite.*—SPIX, **C** 31, l. 6, p. 233.

208. Difficulty of speech; followed by difficult deglutition, anguish, and copious perspiration on chest. *Two and a quarter hours after bite on hand.*—MACH., C 29, ll. 34, 51, p. 229.

209. Hæmorrhage from gums: the blood appeared so thin as to ooze from the vessels. *A few minutes after bite.*—BOY, C 4, l. 2, p. 213.

210. Jaws locked. *Shortly after bite.*—ESSEN, C 10, l. 5, p. 217.

211. The dog frothed at the mouth, and bit at the grass, which he champed as if he were mad. *Soon after bite on foreleg.*—DOG, Ca 12, l. 3, p. 242, C. H. 130.

212. From nostrils and mouth a clear mucous discharge ran down; the submaxillary, parotid and all the glands about the head and neck were greatly enlarged. The eyes were glaring and the pupils much dilated. And the coat was rough and staring. *A few hours after a bite.*—2 HORSES, Ca 22, l. 3, p. 244.

213. Gritting of teeth: (common).—RABBITS, MITCHELL, p. 68.

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Pathogenetic Commentary.

The symptoms in the mouth, tongue and gums are those of perversion of the action of the cells, glands and vessels of the mucous membrane, with degradation of the tissue-change, and great tendency to hæmorrhage; not, however, so analogous to those of scurvy as to those of putrescence, necrosis, and ulceration; that is, those of the septic and zymotic diseases. The mucous membrane becomes dry, swollen, congested, hæmorrhagic; or the mucus becomes excessive, foamy, viscid, sanguinolent; and there is salivation, with viscid sanguinolent saliva. There are numbness and stiffness of the tongue and

lips, and the lips tremble and twitch. Taste becomes blunted and foul; thirst is intense and incessant; the tongue becomes red, sore, swollen, and even protruded; and the gums soften and bleed. Speech becomes thick and difficult, partly from weakness of the vocal cords and partly also from the swelling of the tongue and fauces, and the irregular action of the lips. There are also some neuralgic pains about the teeth. And, as well, the parotid gland, the submaxillary glands, the tonsils, and the parts underneath and at the angles of the lower jaw, become swollen, painful and tender; and the jaws become locked.

v. §10, p. 155.

Therapeutic Application.

The diseases of the mouth in which Crotalus is useful are correspondingly many and of a destructive character, and are most frequently present in septic and zymotic diseases. They are principally:

Stomacace, or Putrid Sore Mouth; especially if occurring in the course of the septic or zymotic diseases, or other toxæmiæ, or degraded states of the system.

Cancrum Oris; especially under the above conditions.

Bleeding Gums; especially when more connected with the above conditions than with scurvy or mercury.

Œdema of Tongue; especially when occurring under the above conditions, or after stings of insects.

Glossitis; especially when occurring under the above conditions, or if there be any threatening of erysipelatous, or gangrenous symptoms.

Syphilis of Tongue; especially if it be threatening destructive ulceration, or gangrene, or sloughing.

Cancer of Tongue; especially if there is much tendency to hæmorrhage.

Parotitis maligna; *Angina Ludovici*; especially under the above conditions.

Salivation; especially if occurring under the above conditions, or if the saliva be sanguinolent or frothy, or there be threatening gangrene.

Clinical Experience.

There is not much clinical experience recorded in the treatment of affections of the mouth with Crotalus; but there is considerable with the very similarly-acting serpent venom, lachesis. v. Jahr's *New Manual*, ii, 33, 34. The present writer cured a case of *Grinding of the Teeth* at night, to the extent of breaking the molars, with *Crt.* 6, within three weeks; though it had existed for years. v. "Face," Clinical Experience—Miss K—, p. 280.

§ 9. Throat Symptoms (214—231).

v. § 9, p. 154.

214. Tickling in pharynx.—LINGEN, C. H. 844, A 1, p. 195.
215. Painful roughness in throat.—SCHMÖLE, C. H. 849, A 1, p. 96.
216. Pricking, and sensation of constriction in fauces. *Fifty-five minutes after five drops* 1x.—HAYWARD, A 4, l. 5, p. 197.
217. Sudden attack of sorethroat, as if swelling of uvula and velum, with dryness of whole mouth; preceded by palpitation and trembling of heart. S. 384. *In night after taking three drops every two hours during the day, 3rd atten.*—E. J. H., A 5, l. 6, p. 197.
218. Waked up about 2.0 a.m. by painful neuralgic drawing in fauces, worse on left side near root of tongue; almost producing choking; not relieved by anything; lasting fifteen minutes. *After 12th dose, twenty drops, 3rd atten.*—HAYWARD, A 3, l. 45, p. 197.
219. Sensation of swelling of velum, with feeling of mucus in fauces, and which had to be swallowed down or hawked up, or as if uvula were hanging too low; followed by constant yawning and a downwards-pulling pain in small spot in head on right side of vertex, and some sore pain about uvula on swallowing. *After 6th dose, ten drops, 3rd atten.*—HAYWARD, A 3, l. 24, p. 196.
220. In the evening sudden attack of sorethroat and bronchial catarrh, which went away in the morning, but returned at night. During several days there was soreness of chest and cough in the evening. *Twenty-six days after pilule 4th atten., being fifth dose of the drug within nine days.*—S. E. S., A 7, l. 36, p. 199.
221. Constant yawning, accompanied by feeling in fauces as if velum were stiff and too long, and as if fauces were lined with mucus. *In evening, some hours after 4th dose of five drops, 3rd atten.*—HAYWARD, A 3, l. 9, p. 196.
222. Larynx painful on being touched. *Second day.*—SCHMÖLE, C. H. 930, A 1, p. 195.
223. Bruised, sometimes shooting pain from larynx to chin, sometimes as far as lower teeth. *Second day.*—SCHMÖLE, C. H. 927, A 1, p. 195.
224. Pains in larynx and other parts of body; increased secretion of mucus in nose and œsophagus; and frequent diarrhœa, accompanied by several curious mental symptoms. *During eight days, after taking pure venom in water.*—DR. HERING, A 11*a*, l. 5, p. 201.
225. After twenty-two hours, constriction in the throat; after twenty-nine hours, angina tonsillaris, difficult deglutition and tongue coated. *After inoculation.*—MANZ, B 3*a*, l. 18, 22, 43, 64, p. 205.
226. Dryness in throat with violent thirst; and red, watery tearful eyes. *One hour after bite on toe.*—WOMAN, C 13, l. 11, p. 218.
227. Pawing at throat and mouth, as if they were uncomfortable. *A few minutes after one drop of* 1x *injected under skin.*—KITTEN, B 3, l. 14, p. 207.
228. Sensation of constriction in throat; pain in tongue and fauces, extending down to stomach. *Two hours after bite on hand.*—MACH., C 29, l. 29, p. 229.

229. Tongue and all round the throat felt as if so tied up that he could not speak.—ESSEN, C 10, l. 20, p. 217.

230. Sanguinolent fluid runs from nostrils; saliva viscid and white; very difficult deglutition—could not swallow some sweetened rum and water offered to him. *Seven hours after bite on hand.*—MACH., C 29, l. 58, p. 230.

231. Respiration difficult; and he had difficulty in swallowing liquids; he could drink, but only a little at a time. *Four and a half hours after two bites on hand.*—DRAKE, C 28, l. 39, 50, p. 227.

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  Morning, 220.

Pathogenetic Commentary.

Idiopathic action of Crotalus on the throat is well marked, and the kind of action is well portrayed by the above symptoms, nearly all of which are contingent. The mucous membrane is congested by it, and made œdematous and morbidly sensitive. Under its action the fauces feel dry, painful, and swollen, or as if lined with mucus that had to be swallowed down; they feel contracted or partially closed; the uvula feels elongated, stiff, swollen; and swallowing becomes so painful and difficult as to produce fear of choking. The larynx feels dry, rough, and painful, or as if lined with mucus that had to be hawked or coughed up; there is pain in it, aggravated by pressure outside, and phonation becomes difficult and indistinct. There is also a sensation of swelling in the course of the jugulars; and the parts about the neck and under the lower jaw and at its angles become swollen, tender, and painful.

Post-mortem examination of these parts has unfortunately been neglected; they would, doubtless, have furnished very characteristic evidences.

Though such symptoms have a near resemblance to the effects of atmospheric vicissitudes, careful examination will discover a deeper

meaning in those related above—will perceive that, like the disturbances in the mind, sensorium, and face, they resemble very closely the throat symptoms of zymotic, septic, and other toxæmiæ.

v. § 10, p. 155.

Therapeutic Application.

In consequence of this profound and general action on the throat, the therapeutic sphere and usefulness of Crotalus in throat affections are both extensive and important. There are, indeed, very few morbid states of the fauces and larynx in which its exhibition would not be attended with benefit. It is especially useful, however, in the morbid states that own anything of a septic or zymotic origin, such as scarlatinal, varioloid, diphtherial, erysipelatous, and chronic syphilitic sorethroats, gangrenous phagedænous, sloughing and aphthous ulceration about the fauces or larynx, mucous patches, necrosis of cartilages, &c.

The principal throat diseases in which Crotalus will be found especially useful are the following, viz.:

Diphtheria, especially malignant, in which life is threatened from the blood-poisoning, and particularly if there is much œdema or gangrene of the fauces or tonsils, or much swelling at the angles of the lower jaw, with the head thrown up and backwards, difficult respiration, dark, swollen, puffy countenance, great prostration, much tremulousness, and very soft, scarcely perceptible pulse; or if vomiting or diarrhœa be present. Ss. 218, 225, 229, 230, 231, 190, 191.

Angina faucium (catarrhal sorethroat, pharyngitis, acute or chronic). When the mucous membrane is of a dark colour and much injected with venous blood, the veins themselves being easily visible; or with much foamy saliva hanging about, or when there is much œdema, or the mucous membrane appears threatened with gangrene; also, when the pain is of a sore, raw, or pricking character, and especially at the left side near the root of the tongue, or extends to the ear, or is as if proceeding from the ear; also when the pain is aggravated, especially by empty deglutition and by swallowing fluids rather than solids; also when there is a sensation of a plug in the throat to be swallowed, or a sensation of contraction or choking, or as if the uvula or velum were elongated or stiff, or as if a dry spot or a tickling in the throat, especially at left side, and particularly on awaking from sleep.

Nervous sorethroat: especially where the pain is out of all proportion with the visible mischief, and when the fauces are dry and there is great irritability and sensitiveness to dry or cold air.

Quinsy: especially when there is much venous congestion, with dark bluish colour of the surrounding parts, and particularly if there is much œdema, or the tonsils bulge and are tender to pressure at angles of lower jaw; also with more pain on empty deglutition than on swallowing food or drink, especially if it occur in connection with scarlatina or diphtheria. It is, however, more suitable for abscess of the velum than for tonsillitis. Ss. 218, 225, 231, 190, 191.

Gangrene (Phagedæna, Sloughing, Cynanche maligna): especially erysipelatous, scarlatinal, syphilitic, and from stings of insects; and particularly in debilitated and broken-down constitutions.

Ulceration: especially spreading, syphilitic, aphthous; mucous patches; necrosis of cartilages.

Laryngitis acuta, Œdema glottidis, Acute Catarrhal Aphonia: especially erysipelatous and scarlatinal; from scalds, stings of insects, irritating vapours, particularly when there is great sensitiveness and irritability on talking, or to contact of dry cold air, or to pressure outside the larynx (which also brings on cough); or when the pain is of a sore, raw, or pricking character, especially at left side, or as if in a small dry spot; or when there is much tickling irritability and hawking, as if from the presence of a little sticky mucus which had to be got up. Also if any of these morbid states occur during the course of scarlatina, morbilli, variola, &c.

Laryngitis chronica, Clergyman's sorethroat, Chronic catarrhal Aphonia: especially with extreme sensitiveness and irritability and dry cough on speaking, particularly in dry or cold air, and with much hawking or hoarseness or loss of voice; sudden tickling causing choking spasmodic cough.

Laryngismus stridulus, Spasmus glottidis: especially when from local nervous irritability, but also when from central irritation, being part of a general convulsive condition; and particularly if during the course of zymotic disease or a part of hysteria.

Paralysis glottidis (Paralytic Aphonia): especially from muscular or nervous irritability, as in hysteria.

Nervous Cough, especially laryngeal: dry, tickling, constant, choking, as if from dry, irritating vapour, or salt or pepper; or as if from dry spot in larynx, especially left side; or as if provoked by dry or cold air, or by deep inspiration, by speaking, and particularly by external pressure on larynx, which, indeed, cannot be borne; or if very apt to occur on awaking from sleep.

Clinical Experience.

Records of the clinical experience with Crotalus in diseases of the throat have not hitherto been numerous, but what there are fully justify the foregoing applications. The present writer has used it extensively and with prompt effect, in many of the above diseases; indeed, he treats very few cases of diphtheria, or œdematous sorethroat without using it some time during the treatment. The following case, amongst many others, occurred in his practice: *Diphtheria:* Mr. R. D—, aged 27, August 11th, 1883, whilst in good health, but weak with overwork and anxiety, was exposed during the day to the exhalations of night-soil, and was immediately attacked with nausea and headache; in the evening he felt seedy and had a fulness in the throat; had a restless night, and next morning felt very low and weak; in the afternoon was so weak he could not walk without assistance, and his throat was very painful and headache frightful. Was called to see him, 8.30 p.m.:

pulse 120, very small and weak; skin hot but perspiring; headache frightful (had a vinegar cloth round it); fauces much swollen and dark red all round; so prostrate he could scarcely raise himself in bed; very thirsty. Ordered ice to suck, and gave *Crt.* 6, half a drop every hour. Called next morning, expecting to find diphtherial throat fully developed, but found him downstairs; and though skin felt rather hot it was otherwise natural; pulse 80, no headache, fauces rather less swollen and red; still some thirst. He exclaimed: "That was wonderful medicine, doctor." *Crt.* continued, every two hours, and he returned to his work next day.

Much evidence in support of the curative power of Crotalus in affections of the throat is afforded by the many cures recorded with the more familiar and very similarly-acting serpent venom, lachesis, v. *Jahr's New Manual*, pp. 35, 45. Dr. R. HUGHES writes of it: "Lachesis is a great medicine for what may be called 'nervous sorethroat.' In its acute form the sense of aching is out of all proportion to the visible mischief. When chronic it is the 'irritable throat,' always uneasy, and causing choking, hawking, and coughing. The feeling as of a dry spot in the throat, or of general dryness of the part, especially on waking from sleep; also of a lump in the throat on empty deglutition, is characteristic of it." *Pharmacodyn.*, p. 601. Dr. R. DOUGLAS HALE, of England, says: "My own experience of lachesis is considerable. In a very bad case of *Syphilitic Phagedæna* of the soft palate and fauces, which threatened to destroy the entire pharynx, the ulceration was arrested by it and healed kindly." *Brit. Journ. Hom.*, xxxi, 127. Dr. MACKECHNIE says: "I have found lachesis of great use in a form of *Sorethroat* which is epidemic at times, where, after the more acute symptoms are allayed, the throat remains painful; the fauces, tonsils, pharynx, &c., are of a dull purplish hue, and there is a tendency to ulceration in points, sometimes with decided venous congestion. In these cases lachesis seems to hasten the relief of this congestion in a very marked manner. In *Gangrenous states* and in *Ulceration* with tendency to sphacelation, lachesis, naja, and Crotalus were all manifestly of use." *Brit. Journ. Hom.*, xxxi, 131. Dr. DRURY "regards lachesis as a valuable remedy in certain forms of *Sorethroat*. One symptom in particular, 'that of a sensation as if there was a fish bone sticking in the throat' was an indication for its use. *Ibid.* p. 130. Dr. CONSTANTINE HERING relates several striking cures with this medicine; one of *Suffocative Cough* and *Sorethroat*. *Brit. Journ. Hom.*, ii, 369. Another *Sorethroat*: "A young, robust sea captain, who had previously suffered from abscess in throat, suddenly felt as if a fish bone had stuck there, and some days afterwards felt, with increasing discomfort, as if a sponge were hanging in the throat; it seemed to impede his breathing, and he felt as if he could hawk it up, but the attempt gave him pain and did no good. He also felt as if there was a small, dry spot, from which pain extended to the ear. There is continual inclination to swallow; there is no pain felt at the spot on swallowing food, but there is during empty deglutition and on applying external pressure. When he presses the throat he feels as if the eyes would spring out of his head, and externally as if he had got a blow on the neck. Between the sternum and glottis he has a throbbing, choking sensation. The throat is better in the morning; it begins two or three hours after rising, and continues until evening. It is little felt during the night. Three doses of lah. at four days' intervals quite cured him." *Ibid.* p. 370. Another, in a lady at the climacteric, with great debility; cured. *Ibid.* p. 371. Another, a chronic syphilitic sorethroat, leucorrhœa, &c., cured. *Ibid.* p. 372. Dr. CARROLL DUNHAM writes: "During the prevalence of *Diphtheria* on the banks of the Hudson, in 1858—60, many cases occurred in which the severity of the constitutional symptoms was very much greater than the local manifestations of the disease in the pharynx would have led one to anticipate. In some cases . . . the prostration of strength was quite alarming; the pulse became, in a very short time, slow, feeble, and compressed; a cold, clammy sweat frequently covered the forehead, the breath was fetid, the appetite entirely destroyed; indeed, the patient passed with alarming rapidity into a completely asthenic condition. In these cases—in all of which the constitutional symptoms thus predominated over the local—lachesis produced prompt

and lasting improvement, so that very rarely was any other medicine given subsequently." *Mat. Med.*, ii, 250. "DR. E. M. HALE" (of America) says DR. R. HUGHES, "contributes to the *Amer. Jour. of Hom. Materia Medica*, vol. i, p. 184, three cases of *Diphtheria* in children, which made a rapid recovery under lachesis, while the rest of the family (altogether eight in number) under the old-school treatment succumbed to the disease." *Pharmacodyn.*, p. 606. DR. C. WESSELHOEFT relates the particulars of a case of severe *Sorethroat* and irritable fauces, cured within ten days by lachesis 30, a dose night and morning. *Brit. Journ. Hom.*, xxii, 336. DR. T. F. ALLEN also bears testimony to its efficacy in Diphtheria; recording the following:—R. H., a boy, ten years old, in good circumstances. December 17th, 6 o'clock, p.m., I was called in great haste, the child was said to be "swelling all up." I found the boy lying stupid, only moving his head when spoken to. The first thing noticed was a large sore about the centre of his forehead, covered with a hard, black scab, the tissue all around hard and inflamed, a puffy swelling extended down on both sides of his nose to his neck which was very much swollen, as were his lips. When he took a swallow of water, he grasped his throat with his hand and evinced the greatest pain. His face was very red but *mottled white* (looked singular), his ears were burning hot to the touch, yet his pulse was only 85, irregular, and softish. He continually picked at his hair, saying, "Tangled and in my eyes," every few minutes he had twitchings of the arms. I was told that in the morning he seemed perfectly well except that he was less lively than usual, that then there was only a small pimple on his forehead, that he had torn the skin between the fingers a little the day before, where now it was filled with dirty matter and much swollen; during the forenoon he talked strangely at times. The throat was internally much swollen and very red. Lachesis 200 dissolved in an ounce of water, a teaspoonful every thirty minutes. Ten p.m., same; moans when called to take medicine, twitchings only once since. 18th, 8 a.m.—He had a very restless night, he kept pulling his hair, could hardly speak in a squeaky voice; throat much swollen and tonsils covered with a dirty white membrane, breath very offensive, hands, arms, and neck very red. Gave the same, with beef tea. In the evening, pulse rapid, hard, and full; was covered all over with abundant scarlet rash, as red as a boiled lobster; throat is very bad, membrane extended across the uvula and up into the nose, had been bleeding from the nose and mouth dark blood, could hardly swallow, saliva constantly ran from the mouth. Unwisely gave belladonna every thirty minutes. 19th, 8 a.m.—Has had a very bad night, delirious, pulling his hair, and trying to get out of bed; throat the same, bleeding at intervals, pulse irregular, rapid, and weak. Gave lachesis. 1 p.m.—Decidedly better, the "last medicine took right hold of him," said his mother; he swallowed more easily; pulse more regular. 8 p.m.—Towards night had taken a whole cup of beef tea and cried for more; throat less swollen and less membrane. Lachesis every two hours. 20th.—Child rested some, not at all delirious; rash much paler though still very thick. Lachesis every four hours. 21st.—At night was taken with severe sharp pain in the bowels with a very dark stool. Arsenic 200, one dose. 22nd.—Pain gone and improving. On the 24th was playing about the house. A younger brother of the above was taken on December 20th with red and swollen neck, pain on swallowing, with considerable membrane extending from one tonsil to the other, "drooping." One dose of lachesis seemed to check any further development, and in two days he was quite smart. *Amer. Hom. Rev.*, iv (1864), p. 556. DR. P. P. WELLS relates the particulars of a case of *Abscess* in neck:—H., a boy, aged 9, attacked with scarlet fever, followed by a swelling on left side of neck, extending from angle of jaw down to near clavicle. It suppurated and formed a large sloughing abscess, with severe constitutional symptoms and great prostration. Cured by lachesis. *Amer. Hom. Rev.*, 1864, p. 362. And DR. J. H. P. FROST relates the particulars of a severe case of *Membranous Croup* or *Diphtheria*, in a child of two years, "apparently in a dying condition," relieved immediately, and rapidly cured, by lachesis 8. *Brit. Journ. Hom.*, xxiii, 671. THOMAS ENGALL, ESQ., surgeon, London, sends the following:—Mr. B., married, family. Has had for years an irritable throat, it looks red, flabby, and tonsils are enlarged. August 7th, 1883.—Had lachesis 4th c., two drops night and morning. Sept. 1st.—Better. Repeat lach. Oct. 6th.—Throat is much better, the tonsils are reduced. Lach. repeated, which it is expected will complete the cure. Further evidence is afforded by the cures with the other very similarly-acting serpent

venom, naja; of which DR. R. HUGHES writes: "Naja has proved in my hands very useful in cough, laryngismus, and even spasmodic stricture of the œsophagus, when these are the result of spinal irritation affecting the nucha." *Pharmacodyn.*, p. 602. DR. RUTHERFORD RUSSELL writes: "In some affections of the pharynx and œsophagus the action of naja is very well marked, and I have great confidence in it in cases of cynanche tonsillaris characterised by the livid-purple colour of the part and the feebleness of the circulation." *Annals of Brit. Hom. Society*, i, 304. And he gives the particulars of a case of *Nervous Cough*: "Miss —, aged 26. She coughed almost incessantly the whole of Wednesday night. On Thursday there was considerable heat of skin, and the fauces were red; there was also some tenderness to touch at the larynx, with inclination to cough when pressure was made there. I gave half a grain of the 1st decimal trituration of naja, in eight spoonfuls of water, one to be taken for a dose. On the following day the patient, who is a person of intelligence and education, reported that she felt relief after the first spoonful; the cough almost entirely subsided at night, the redness of the fauces and swelling of the tonsils were gone, and in every respect she felt perfectly well. She was not aware what medicine she had been taking. She had formerly had one or two similar attacks under allopathic treatment, and they had lasted several weeks, and left her much debilitated at the end. Some weeks after this she had, under my care, a similar attack, which was immediately arrested by naja." *Brit. Journ. Hom.*, xii, 213. MR. ENGALL sends the following:—Mr. R., aged 54. Was in his youth the subject of heroic treatment in the form of copious blood-letting, blistering, and the other appliances of rational medicine. He has for a great number of years been subject to chronic sorethroat, the arches of the palate are red and highly relaxed, the uvula hangs down, the point of it tapering to a thread, the irritation caused by it producing a constant inclination to clear the throat, and a wish on the part of the practitioner to cut it off. He had taken a variety of medicines but without any visible benefit, when in November, 1882, he had cobra, two drops night and morning, 3x. This was continued in December with much benefit, the uvula had contracted, and the whole bag of the pharynx had assumed a healthy tone. In April of this year, 1883, I saw the patient, who said his throat was all right. As a precautionary measure he received some lachesis 6, since which, his throat has been no cause of annoyance to him or to others. And still further evidence is afforded by the cures with the very similarly-acting insect venom, tarantula. DR. JOSE J. NAVARRO, of Santiago, in the *Hom. Times*, gives the particulars of a case of severe "*Tonsillitis*" in which both tonsils were so swollen that suffocation was feared. A few doses of taran. cubensis dispersed the swellings and accompanying symptoms in a few hours." And DR. SAMUEL TWEEDLEY, of Philadelphia, writes: "Tarentula cubensis, I have found, will cure *Diphtheritic Fever*, in its highest forms with delirium, in about the same time that aconite cures acute inflammatory fever; and, if given at the proper time, rarely wants any other medicine to perfect the cure." Letter in Boericke and Tafel's *Bulletin*, March, 1883.

§ 10. Œsophagus and Stomach Symptoms (232—276).

v. § 9, p. 154.

232. Scraping rancid sensation from pharynx down to stomach, with pressure in epigastrium.—SCHMÖLE, C. H. 848, **A** 1, p. 195.

233. Heartburn the whole day, especially afternoon, with sensation as if whole œsophagus up to mouth were filled with rancid fluid, with eructation tasting of ingesta.—SCHMÖLE, C. H. 848, **A** 1, p. 195.

234. Eructation of sharp sour fluid, after eating some white bread: *fourth day*.—SCHMÖLE, C. H. 1200, **A** 1, p. 195.

235. Rancid eructation the whole afternoon: *fourth day*.—SCHMÖLE, C. H. 1199, **A** 1, p. 195.

236. Nausea and malaise and feeling as if something rancid rose up to œsophagus.—SCHMÖLE, C. H. 1094, **A** 1, p. 195.

237. Nausea with malaise after meals, increased by standing or walking, relieved by sitting.—KUMMER, C. H. 1086, **A** 1, p. 195.

238. Nausea with headache.—C. H. **A** 1, p. 195.

239. Vomiting with giddiness.—KUMMER, C. H. 1155, **A** 1, p. 195.

240. Vertigo, frontal headache, pain above eyes and in temples, worse on right side; with malaise, bilious vomiting, and a necessity to lie down; associated with constipation. Better after a walk in open air. C. H. **A** 1, p. 195.

241. Pressure in stomach and uncomfortable sensation about region of epigastrium, as if he had eaten too much—a similar sensation to that occurring before syncope, which came on a few minutes later. SCHMÖLE, C. H. 1262, **A** 1, p. 195.

242. Awakened by violent burning pain in hypogastrium, going through to sacrum; burning pain in epigastrium for half an hour. The soreness in epigastrium returned next day, and extended upwards under sternum; also, pain in stomach after breakfast and dinner; and in the morning the stomach felt sore and tender, worse after food; urine scanty and red, followed by headache, &c. (v. Symp. 105) and early and free catamenia (v. Symp. 312). *After pilule of 4th dil. taken in the evening.*—S. E. S. **A** 7, ll. 16, 21, p. 199.

243. Weight on stomach and chest; breakfast lies heavy all day; standing fatigues her much; tremulous weakness all over, as if some evil were apprehended, flatulence and eructation. Next day stomach sore and tender on rising in the morning; tongue red and sore; gums white; throat dry, with thirst; same symptoms, but milder, next day: they gradually passed off. *After a few doses 3 cent.*—S. E. S. **A** 7, l. 5, p. 199.

244. Shootings in pit of stomach.—LINGEN, C. H. 1297, **A** 1, p. 195.

245. Yawning.—SCHMÖLE, C. H. 2705, **A** 1, p. 195.

246. After some topical inflammation (v. Symp. 556) at end of ten minutes a sudden dig at the heart, and pulse was increased in frequency by ten beats (v. Symp. 391); at end of fifteen minutes quivering sensation in epigastrium, with slight nausea; at end of thirty minutes pulse had fallen to ten beats below normal, was small, soft, empty, and very easily compressible; there were frequent sneezing and much catarrhal irritation in nose, with a faint sinking sensation in epigastrium; then followed a great craving for stimulants, especially wine. *After rubbing a little venom into scratch on wrist.*—HAYWARD. **B** 1, ll. 13—20, p. 202.

247. Great thirst from first, drinking large quantities of water. *After two bites on foot.*—MISS BIGGS, **C** 2, l. 14, p. 212.

248. Incessant thirst, with dry tongue, and dry consuming fever. *After a bite.*—SPIX, **C** 31, l. 6, p. 233.

249. Within an hour, violent vomiting, and at same time purging and urination. Vomiting, tenesmus and strangury existed without intermission for nearly two hours. Thirst was excessive, and the water he drank was immediately ejected or passed in limpid urine; the

quantity of urine secreted was really surprising. After two hours and a half the vomiting ceased, but he complained of pain in stomach and great thirst, and the tenesmus and micturition distressed him every few minutes. The extremities were cold, and the pulse weak and slow. Bloody mucus passed *per anum;* and he expectorated about half an ounce of a bright florid colour, with the sputa. He was extremely restless; threw off all his clothes and rolled about on the ground, the pain being concentrated at the epigastrium. His temperature was low; and his pulse small, slow, and sinking. *After a bite on heel.*—FRANCISCO, C 6, l. 25, *et seq.*, p. 214.

250. Along with some delirium, drowsiness, and marked influence on the hearing and vision; and on the heart, respiration, and temperature. "The patient had repeated attacks of sickness, vomiting at first portions of undigested food mixed with a greenish fluid, then of thick viscid mucus like white of egg slightly stained yellow. There was one copious emission of urine, but afterwards only small quantities of very pale urine. At the same time a watery diarrhœa set in, with colic and tenesmus, and excessive thirst." There was occasionally great restlessness, with some twitching. Under stimulants these symptoms passed off within a few hours (l. 61). *Three hours after bite on hand.*—JEF., C 30 *a*, l. 28, 35, p. 232.

251. After a bite on finger pain was intense, and immediately produced a sickening sensation; and he shortly vomited freely.—WDH., C 23, ll. 4, 6, p. 222.

252. Nausea, and distressed anxious feelings. *A few minutes after bite.*—BOY, C 4, l. 6, p. 213.

253. Answers incoherent, he complained of sickness; skin was cold; pulse 100. *Two hours after bite on thumb and finger.*—SOPER, C 33, l. 9, p. 234.

254. Deathly sickness. *Eight hours after bite on ankle.*—NEGRESS, C 14, l. 3, p. 218.

255. Nausea and vomiting on attempting to walk; continuing for several days. *Twenty-four hours after bite on finger.*—WDH., C 23, l. 11, p. 222.

256. Extreme nausea, and vomiting on least exertion. *Twenty-six hours after two bites on foot. Apparently checked by quarter-grain doses of oxide of arsenic.*—BIGGS, C 2, ll. 14, 21, p. 212.

257. Incessant vomiting and insatiable thirst, drinking cold water every few minutes. *Five hours after bite on finger.*—STEEL, C 22, l. 14, p. 221.

258. Constant retching to vomit, though but little was ejected. *Thirty-six hours after bite on leg.*—BOY, C 9, l. 5, p. 216.

259. Repeated vomiting. *One, one and a half, and two and a half hours after two bites on hand, and afterwards.*—DRAKE, C 28, ll. 28, 34, 41, p. 226.

260. Vomiting of food and medicine. *Twenty-one hours after bite on thumb and finger.*—SOPER, C 33, ll. 37, 44, p. 234.

261. Violent vomiting of food [this lasted for several days, following each meal]. *Ten minutes after bite on toe.*—WOMAN, C 13, l. 10, p. 218.

262. Vomiting, the ejecta of bright grass green colour. *Two and a half hours after bite on instep.*—Miss R—, **C** 5, l. 15, p. 213.

263. Vomited again, yellowish green fœtid ejecta. *One and a half hour after two bites on hand.*—Drake, **C** 2, l. 29, p. 226.

264. Continuous thirst; hiccough; bilious vomiting; palpitation of heart; anxiety; rapid, weak pulse; languor, and rapid failure of vital powers. —Kolbani, C. H. 2984.

265. Agonising pain in stomach, with great restlessness, cold fingers and general depression of temperature, with slow, weak, small pulse. *After a bite on heel.*—Francisco, **C** 6, ll. 25, 29, p. 214.

266. Pain and stricture at epigastrium, lasting several hours. *Five hours after bite on finger.*—Steel, **C** 22, l. 14, p. 221.

267. Blood with vomit; and from eyes, nose, and ears. *After a bite.*—Spix, **C** 31, l. 4, p. 233.

268. Weakness and incessant thirst. Respiration occasionally jerky; and heart's action rapid and feeble. *Two hours after bite on thigh.*—Dog, **Ca** 4, l. 5, p. 238.

269. During first week the dog took scarcely any food, though he drank water almost incessantly, and was subject to profuse dysenteric discharges, so that he became remarkably emaciated. *After bite on thigh.*—Dog, **Ca** 4, l. 16, p. 238.

270. Refused to eat, but drank at frequent intervals, with languor and confusion. *For twenty-four hours after bite on shoulder.*—Dog, **Ca** 1, l. 6, p. 237.

271. Slight ineffectual efforts to vomit, with general feebleness. *Half hour after bite on shoulder and leg.*—Dog, **Ca** 3, l. 3, p. 238.

272. Struggling to vomit. *Soon after bite on fore-leg.*—Dog, **Ca** 12, l. 2, p. 242.

273. Still lying on her side making efforts to vomit. Upon lifting her up she succeeded in vomiting a little mucus, and passed loose stool; and soon after lying down again urinated freely. *One hour after two bites.*—Dog, **Ca** 9, l. 14, p. 241.

273*a*. Gaping.—Rabbits, common, Mitchell, p. 68.

274. The pyloric opening of stomach was rather constricted; the internal lining of stomach had its vessels very turgid with blood. *P.M. Sixteen hours after death from bite on hand.*—Soper, **C** 33, l. 145, p. 236.

275. Covering of stomach and intestines charged with blood, as if from violent blows. Peritoneum also red and its veins swelled out with blood; but mucous membrane was unaffected. *P.M. Quarter of an hour after death.*—Dog, **Ca** 11, l. 10, p. 242, C. H. 130.

276. Abdominal contents very much inflamed, especially stomach and intestines, which contained a mucous matter, the greatest part of which was blood, and the villous coat was entirely destroyed. *P.M. next day after death.*—Dog, **Ca** 13, l. 5, p. 243.

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Pathogenetic Commentary.

As shown by the above symptoms, many of which are contingent, Crotalus affects the whole of the digestive tube from the mouth to the anus, involving in its action not only the nerves, vessels, and mucous membrane, but also the glands and muscular coat, and even the peritoneal covering. This action shows itself in hyperæsthesia and irritability, with engorgement, softening, and disorganisation, hæmorrhage, and extravasation; in fact, in states very similar to those it induces in the mouth and throat, and leading to similar inferences. The resulting stomach symptoms are sinking at the epigastrium, thirst, want of appetite, craving for stimulants, eructation, nausea, and vomiting. The eructations are rancid or sour, and the vomited matters are food or

mucus which is viscid, green, bloody; sometimes pure blood is vomited, and there are pain, soreness and tenderness in the stomach, and quivering sensation at the epigastrium. Many of these symptoms, especially the nausea and vomiting, are in a great part cerebral, from the action Crotalus exerts on the brain and medulla oblongata and the origin of the pneumogastric nerve. In subacute and chronic cases these parts are, indeed, found after death in a state of vascular engorgement with threatened softening. Most of these symptoms are, however, doubtless results of the direct action on the stomach itself, and its nerves and vessels; for, as may be seen by reference to the post-mortem results, the lining membrane of the stomach was found engorged with blood, and the pyloric orifice was contracted, whilst the peritoneal covering was red, engorged, and very much inflamed and ecchymosed—was dotted with ecchymoses. v. Ss. 274, 275, 276, 292.

v. § 10, p. 155.

Therapeutic Application.

In consequence of this disorganising action on the stomach and its nervous and blood supply, Crotalus has an important place in the treatment of stomach disorders. It is especially useful in the treatment of its hyperæsthetic, congestive, and hæmorrhagic conditions, and when there is hæmatemesis or ulceration, and particularly when there is a distressing sensation of sinking, craving for stimulants, or much nausea or vomiting; also in gastric disturbances of nervous origin—cerebral, sensorial, or reflex—such as occurs on the invasion of the zymotic or septic diseases, or in connection with menstrual or uterine complaints, jaundice, nephritis, albuminuria, &c.

The special stomach disorders in which Crotalus is most plainly indicated are:

Œsophagismus; where the hyperæsthesia is of a more profound origin (as cancerous) than that in which ign. is so effective (hysterical?), and which brings on tonic spasm or obstinate spasmodic structure.

Vomiting; especially that which occurs on the invasion of the zymotic diseases, or is sympathetic of disease elsewhere, as in the brain, kidney, liver, uterus, &c.; in albuminuria, jaundice, pregnancy, orchitis, *mal de mer;* or is attended by much drowsiness, or giddiness; or if the vomited matters contain much green, slimy mucus or uncoagulated blood. In Gastric Catarrh, Gastritis. Ss. 240, 249, 250, 251, 256 to 263, 271, 272, 273.

Hæmatemesis; especially when the blood has little or no tendency to coagulate, or is dark, as if from passive congestion or malignant disease, or atonic ulcer, or when the disease is sympathetic, as in vicarious menstruation.

Cancer; when there is much hæmorrhage or much vomiting of mucus—slimy or sanguinolent.

Atonic Dyspepsia; especially from nervous irritability of the stomach, or passive congestion of the mucous membrane, or degeneration of the

peptic glands; and particularly with drowsiness, or with vomiting of slimy, green, or sanguinolent mucus, or when there is great craving for stimulants.

Clinical Experience.

There has not yet been recorded much clinical experience with Crotalus in the treatment of disorders of the stomach. The following case occurred in the writer's practice:—*Vomiting—Gastritis:* Mrs. S—, aged 62, the subject of apoplexy, with cutaneous eruption (suspicious of being old syphilis), and chronic alcoholism, was gradually breaking down; had no appetite, had constant nausea and vomiting, vomiting even small sips of brandy and toast-water; she looked a pitiable object. *Crt.* 6, one drop in a teaspoonful of water every two hours, was prescribed. This arrested the nausea and vomiting at once, so that after a few hours she was able to retain milk, and afterwards beef tea; there was no vomiting after the first dose of Crotalus. For three weeks she had no more vomiting, but after that time it returned, and was more or less troublesome until her death, six weeks afterwards. Rhs., kre., and pho. afforded marked relief.

Atonic Dyspepsia. Mrs. E—, aged 57, had gastritis two years ago, now has been exhausted by nursing sick family; is debilitated and bloodless, and complains of having suffered for some time with continued dull, heavy, throbbing, occipital headache, and frequent faint, sinking, hungry sensation about epigastrium, with a trembling and fluttering sensation a little lower down above the umbilicus, followed by flushing of heat over whole body, also extreme weakness. Tongue very red, smooth and polished, and feels swollen; mouth feels foul and sticky on awaking. *Crt.* 6 four times a day. Within a week all the symptoms except the headache had disappeared.

Spasm of Œsophagus.—Dr. S. P. BURDICK records the following case:—Mrs. S—, aged about 30, suffered for many years from a peculiar affection which seemed to be hysterical in origin. About nine years ago she began to have difficulty in swallowing any solid substance. This gradually became worse so that deglutition of any solid substance became quite impossible. Her soup even had to be strained so as to remove all meat fibre and solid particles. During this time she was under the treatment of various physicians, but received no apparent benefit. About five years ago the late Dr. Ad. Reisig treated her with considerable degree of success, so that she could swallow a few semi-solid substances. She, however, relapsed after his death, and so continued until October last when she came under my care. After studying her case closely, I selected Crotalus as promising more than any other remedy. She received Crotalus 200, and made slow but marked improvement for five months, at which time she was perfectly well. When she came under my care she was greatly emaciated, but she now eats freely of any description of food, and is plump and in excellent health.—*American Homœpath*, July, 1883, p. 197.

Further evidence in support of the curative power of Crotalus in disorders of the stomach, is afforded by the cures with the more familiar and very similarly acting

serpent venom, lachesis (v. *Jahr's New Manual*, ii, 37, 38, 39). DR. HERZBERGER records a severe case of *Œsophagismus* cured with it. *Brit. Journ. Hom.*, xxxvi, 376. And DR. CONSTANTINE HERING gives a severe case of *Dyspepsia* with giddiness, indolence, occasional bulimia, and suffocating sensation of dyspnœa after eating, and sometimes vomiting of food. Cured rapidly with lah. *Brit. Journ. Hom.*, ii, 376. And still further evidence is afforded with the other very similarly-acting serpent venom, naja; of which DR. R. HUGHES writes: "In *Spasmodic Stricture* of the œsophagus (appropriately called by JOUSSET 'œsophagismus') ignatia would be the most obvious medicine; but I have more than once obtained such excellent results from naja, as to be inclined to count it the principal remedy for the affection." *Therapeutics* ii, 66. And DR. RUTHERFORD RUSSELL says: "Cobra does good in *Dyspepsia* with foul, white, or yellowish-white tongue, rawness of throat, soreness of stomach or pressive pain." *Brit. Journ. Hom.*, xi, 598.

§ 11. Abdominal Symptoms (277—293).

v. § 9, p. 154.

277. Cannot bear the clothes round stomach and below hypochondria, first day. Before and after with same clothing, no inconvenience. —SCHMÖLE, C. H. 1336, **A** 1, p. 195.

278. Pressing pain in middle of abdomen, below navel, as if too full there.—SCHMÖLE, C. H. 1346, **A** 1, p. 195.

279. Deep pain in region of navel, like violent burning, first day. —SCHMÖLE, C. H. 1343, **A** 1, p. 195.

280. Pain in left side of abdomen, like a cut through spleen from violent running, much aggravated by deep breathing, first day; same pain also second day after a stronger dose, but not quite so bad.—SCHMÖLE, C. H. 1324, **A** 1, p. 195.

281. Awakened at night by violent pain in hypogastrium, going through to sacrum. Burning pain in epigastrium for half an hour, ceasing after a stool. *After pilule 4th atten. taken evening.*—S. E. S—, **A** 7, l. 16, p. 199.

282. Visible twitching of muscles of loins.—LINGEN, C. H. 1557, **A** 1, p. 195.

283. Shooting pain in the liver (which she never had before). Whilst taking 3rd trit.—MRS. M—, NEIDHARD, *special communication.*

284. After slight topical effects (v. symp. 558) and severe dizziness (v. symp. 49) and much mental disturbance (v. symp. 11); during second evening had severe, sharp, shooting, rather burning pain, repeating at short intervals, apparently starting about left side of womb and passing upwards to region of transverse colon, and there shooting or cutting across, as if from both sides towards centre; thence passing up left side of trunk to face and temple as a sharp, cutting, intermittent, neuralgic pain; and across middle of forehead there was a heavy, dull, continuous pain (v. symp. 114); there was also the same mental dulness described in symp. 11. *After rubbing a little venom into scratch on wrist.*—E. D—, **B** 2, l. 24, p. 204.

285. The white corpuscles were observed to cling in quantities to the walls of the vessels and, as the current of blood hurried through them, some masses of pale matter, like aggregations of white cor-

puscles, were observed to pass with the stream; very soon marked extravasations of red corpuscles took place, and to the naked eye the mesentery became discoloured by patches of ecchymosis in the course of the small blood-vessels, like the foliage on the branches of a tree. *Immediately after application of watery solution of venom to mesentery.* **B** 7, l. 4, p. 208.

286. Circulation soon diminished in some vessels but continued vigorous in others. Isolated extravasated patches soon made their appearance of a triangular form, others followed and coalesced with these until a network was formed in the course of the vessels all over the field of the microscope. The extravasation soon became general, the circulation still continuing slowly. After application of the venom to mesentery. **B** 9, l. 3, p. 208.

287. Violent pain in course of colon. *Twenty-four hours after bite on arm.* LAKE, **C** 26, l. 19, p. 225, v. l. 36, &c.

288. Within an hour violent vomiting, and at same time purging and urination, as if from an intense degree of gastro-intestinal irritation manifested by spasmodic contraction of the alimentary canal and the bladder. The vomiting, tenesmus, and strangury existed without intermission nearly two hours; with great thirst and excessive urination. *After a bite on heel.*—FRANCISCO, **C** 6, l. 25 *et seq.*, p. 214.

289. Inguinal glands on that side much enlarged. *Twenty-six hours after two bites on foot.*—BIGGS, **C** 2, l. 12, p. 212, v. S. 583.

290. The mucous coat of small intestines exhibited patches of acute inflammation throughout the whole length, of a lively red colour, and of various diameters from six to twelve or eighteen lines, and very close in succession, especially in the jejunum. *Post-mortem four hours after death from bite on arm.*—LAKE, **C** 26, l. 36, p. 225.

291. The extravasation extended from leg through femoral ring, under the peritoneum, into pelvis, and on inner face of ileum. The colour of the tissues thus stained was a brilliant scarlet. The abdominal viscera were healthy except that the mucous membrane of the lower bowels was somewhat congested. *P.M. shortly after death.*—DOG, **Ca** 26, l. 21, p. 240.

292. The intestines were spotted at intervals with ecchymoses four to five lines in diameter, and apparently just beneath the serous covering, the cavity of which contained a little bloody serum. The intestines, from œsophagus to rectum, were dotted with ecchymoses and filled, especially the large gut, with blood and mucus. *P.M.*—RABBIT, **Ca** 26, l. 22, p. 246.

293. "The intestines were ecchymosed and congested. There were effusions of red serum into the peritoneal cavity; and much ecchymosis of peritoneum and subperitoneal and intra-muscular areolar tissue." *After injection of dissolved dried venom into peritoneum.*—GUINEA-PIG. **B** 10, *P.M.*, l. 25, p. 209; **B** 11, l. 10, p. 209; **B** 12, l. 12, p. 209.

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Pathogenetic Commentary.

The above symptoms, many of which are contingent, make it evident that Crotalus has an idiopathic effect on the abdominal contents; and that to the extent of producing congestion, inflammation and extravasation, on both mucous lining and peritoneal covering. The abdomen becomes very tender, with peculiar sensibility to the pressure of the clothes; there are tenderness and shooting pains in the region of the liver; jaundice, diarrhœa, and dysentery. The pains are sharp, and mostly in the umbilical region and left side, especially in the region of the left ovary. After death, in subacute and chronic cases, the intestines were found to be congested and ecchymosed, with effusion of serum into the peritoneal cavity, the subperitoneal and intermuscular areolar tissue; and the mucous coat of the small intestine exhibited patches of acute inflammation throughout the whole length, especially the jejunum, and the submucous tissue and the peritoneal covering were engorged, softened and ecchymosed. These are results very similar to those found after death from typhus and typhoid fevers. v. Ss. 290—293.

v. §10, p. 155.

Therapeutic Application.

These pathogenetic effects and post-mortem results make it evident that Crotalus may be relied upon to afford much help in the treatment of many abdominal diseases; especially if occurring in connection with septic or zymotic disease, or in broken down or hæmorrhagic constitutions, or if marked by low asthenic inflammation, or tendency to gangrene.

The abdominal diseases in which Crotalus is most plainly indicated are:

Peritonitis; especially when occurring in the course of septic or zymotic disease, dissection wounds, pyæmia, puerperal fever, erysipelas, abdominal operations, ovariotomy, herniotomy, colotomy, &c., particularly if the temperature sink below the normal, or there be present a low debilitated or hæmorrhagic condition. Ss. 227, 292, 293.

Typhlitis and Peri-typhlitis; especially when occurring in the course of, or as a sequela of zymotic, septic or other prostrating disease; or in broken down or hæmorrhagic constitutions, or the temperature sink below normal, or there be much vomiting or diarrhœa. Ss. 265, 277.

Passive Hepatic Congestion; especially when from heart disease, or from imperfect performance of the uterine functions, or if a sequela of malarial fever.

Acute Atrophy of Liver—the pathological basis of malignant jaundice—especially if occurring in toxæmic states, such as puerperal fever, pregnancy, &c.

Acute Jaundice—jaundice of hæmatic rather than of hepatic origin. —"Sometimes," says Dr. R. Hughes," acute jaundice takes on a malignant character, being accompanied with hæmorrhage and cerebral disturbance, and threatening speedy death. This condition is a regular part of yellow fever, and may supervene in the course of other toxæmic disorders; it may also be connected with acute atrophy of the liver. . . . . When the jaundice originates in the blood, the serpent poisons, especially Crotalus, are indicated, as in yellow fever." *Therapeutics*, II, 131. For its place in ovario-uterine disorders, v. "Sexual Organs," p. 308.

Swelling of Inguinal Glands, Bubo; especially from septic absorption, as from sloughing sores on genitals, or gangrenous affections of toes, &c.; also in sloughing buboes. Ss. 289, 583.

Clinical Experience.

Clinical experience with Crotalus in abdominal diseases has hitherto been only limited. Some are reported by Jahr, *New Manual*, i, 617. And the following cases have occurred in the practice of the present writer. *Peritoneal Irritation.*—Miss D—, aged 19, a sorter and ripper, working in a small confined room connected with a dye works, has been in a low state of health for some time, and complaining for some weeks of heat and tenderness of abdomen so that she could scarcely bear her clothes on. Menstruation and action of bowels as usual. Appetite only middling. No fever. *Crt* .6, five times a day, cured her within a week. *Perityphlitis.*—G. R—, aged 16, whose father was a *bon vivant* and had liver disease, is a weak, pale, bloodless boy, subject to bronchitis and asthma; after a nervous shock and a period of grief, followed by a chill, was on Saturday evening, July 28th, 1883, attacked with headache, malaise, feverishness, and thirst; these were soon followed by severe pain, and then tenderness in right iliac region, with vomiting, very rapid pulse, and very hot and dry skin. These sym-

ptoms continued and grew worse during Sunday and Sunday night, notwithstanding his mother giving him acon. 3 and nux 3 every hour alternately. Had no sleep Saturday or Sunday night. When visited on Monday forenoon he was found with foul tongue having a red tip, no appetite, extreme thirst, no action of bowels since Friday morning though previously every day; pulse 140, skin hot and dry; extreme pain in region of appendix, with frequent paroxysmal aggravations; great tenderness on pressure in a spot size of small orange, with some feeling of hardness; could not bear right leg straightened, but lay with it kept bent and supported by a pillow. Acon. and bry. every hour alternately, with nothing more than toast-water and oatmeal gruel. At 9.0 p.m. all the symptoms were found aggravated. Acon. and bry. ceased, and *Crt.* 6 substituted, a drop every hour. About 12 p.m. he broke out into a profuse perspiration; about 4 a.m. he felt considerably less pain and fell asleep. When seen, 11 a.m. on Tuesday, it was reported that some dark, offensive fæces had passed; pulse was 100, no headache, much less thirst, paroxysms of pain only seldom and less severe, still very tender to pressure in iliocæcal region. Continue *Crt.* At 8.0 p.m. was found altogether better, can straighten leg without pain. Continue. At 11 a.m. on Wednesday was found with very little to complain of. Pulse 100. Ars. 3 every three hours. On second day after this there was some imprudence in diet, and he had a relapse. This was, however, soon subdued with *Crotalus*, and he ultimately made an excellent and complete recovery.

Jaundice, hæmorrhagic; September 8th, 1883.—Miss C. T—, aged 7, was stung on upper eyelid by a wasp. Both upper and lower lid, and all around orbit, swelled rapidly, and she immediately became sick and faint. Her mother applied a paste of "blue," and administered bellad. 1 every hour. Next morning she appeared better, but had headache and feverishness. When visited on the 12th, was found with foul tongue, thirst, headache, dusky flush on face, yellowness of skin all over, and tenderness of liver, with scanty dark urine, pulse 128. The swelling had disappeared from face, and no mention being made of the sting, it was diagnosed congestion of liver from chill, and bryonia and nux 3 were prescribed. In the evening she became very feverish, headache worse, and much dark hæmorrhage occurred from nose; her mother gave her bellad. 1 again. When visited next day by writer's assistant the hæmorrhage was still frequent and copious, and she was still feverish and yellow. He prescribed bellad. and nux. When seen by the writer the day following, *i.e.* the 14th, more full inquiry elicited the fact of the wasp sting; and, as there were still epistaxis unchecked, dusky flush of face, headache, pulse 130, yellow skin and conjunctivæ, dark urine, tender liver, white stools, and nausea, *Crt.* 6 was prescribed, one drop every two hours. After the first dose there was no more hæmorrhage, and all the other symptoms disappeared rapidly, so that when visited next day she wished to be allowed to leave her bed.

Dr. Neidhard has sent the following cases:—Mr. B—. *Stitches* in the region of the liver on drawing a long breath, aggravated by pressure. Complete loss of taste, constipation, urine jelly-like and red like blood. Cured by *Crt.* 3. Mrs. T—. *Pain* in region of liver,

also on top of shoulder; pulsation in ascending aorta, nausea on movement, stools white; bilious vomiting every month after menstruation. Cured by *Crt.* 200.

With the more familiar and very similarly acting serpent venom, lachesis, clinical experience in the treatment of abdominal affections has been very great, and many cures have been accomplished (v. *Jahr's New Manual*, ii, 40, 41). Dr. Conrad Wesselhoeft gives a case of *Peritonitis* rapidly cured by it after failure with acon. and bry. *Brit. Journ. Hom.*, xxii, 485. And a case of severe *Abdominal Pain*, presumably connected with the uterus, rapidly cured with the same medicine. *Ibid.* p. 492. Dr. Francis Black gives a case of *Perityphlitis* rapidly cured with lachesis, and refers to others cured by the same medicine (v. *Brit. Journ. Hom.*, v, 42 (v. also *American Hom. Rev.*, 1863, p. 558). Dr. Jousset, in his *Leçons cliniques*, speaks highly of *Vipera*, another very similarly-acting serpent venom, in the treatment of *chronic hepatic congestion.*

§ 12. Symptoms of Stools, Rectum and Anus (294–307).

v. § 9, p. 154.

294. Frequent diarrhœic stools, with pain in abdomen from navel downwards.—Schmöle, C. H. 1456, A1, p. 195.

295. Pappy (mashed or pasty) stool.—Lingen, C. H. 1480, A1, p. 195.

296. Frequent diarrhœa, increased secretion of mucus in nose and œsophagus; and pains in larynx and other parts of the body; accompanied by several curious mental symptoms. *During eight days after taking pure venom in water.*—Dr. Hering, A 11*a*, l. 6, p. 201.

297. Feeling desire to go to stool he was assisted from bed for that purpose; whilst on the way he was seized with general spasm, without foaming at mouth; being laid on the floor it went off in a few minutes, and he had an involuntary evacuation of a dark bilious colour. *Twenty hours after bite on arm.*—Lake, C 26, ll. 14, 36, p. 225.

298. Involuntary stool, of dark bilious colour. *Twenty hours after bite on arm.*—Lake, C 26, l. 18, p. 225.

299. Frequent stools; one half an hour, another an hour, and a third two hours and a half. *After two bites on hand.*—Drake, C 28, l. 31, p. 226.

300. As well as excessive thirst and repeated attacks of vomiting, there was "watery diarrhœa with colic and tenesmus." There was also occasionally great restlessness with some twitching. *Three hours after a bite on hand.*—Jef., C 30*a*, l. 35, p. 232.

301. After an hour was found standing with head pendent, having just vomited glairy mucus. Pulse quick, and feeble respirations, occasionally panting. . . . . After twenty hours was found lying on side, having passed slimy and bloody stools in abundance. At intervals much tenesmus and great weakness; the weakness continued to increase; his hind legs twitched, and the dysentery continued and increased, and he suddenly passed at least four ounces of dark grumous blood. His blood lost its power to coagulate. After fifty-four hours he drank water freely and began to improve; he began to eat; and on the fourth day the blood was found to be regaining its

power to coagulate. He continued to improve, but profuse suppuration took place; the abscess being still open at the end of two weeks. *After double bite on flank.*—Dog, **Ca** 5*a*, ll. 5, 11, 20, &c., p. 239.

302. Had passed liquid and very dark stools, and some urine, during the afternoon; and the floor of the box in which he was left for the night was found next morning to contain a good deal of dark semi-fluid excrement, streaked with blood; and he had drunk nearly a third of a bucketful of water. *After bite on shoulder.*—Dog, **Ca** 5, ll. 8, 14, p. 238.

303. During first week the dog took scarcely any food, though he drank water almost incessantly, and was subject to profuse dysenteric discharges, so that he became remarkably emaciated. *After bite on thigh.*—Dog, **Ca** 4, l. 16, p. 238.

304. Bowels acted loosely, with grey discharge, and there seemed to be some tenesmus in the rectum. *Twenty minutes after bite on thigh.*—Dog, **Ca** 6, l. 8, p. 239.

305. Discharge of excrement, involuntarily, tinged with blood. *Ten minutes after bite on nose.*—Dog, **Ca** 13, l. 3, p. 245.

306. After a few minutes passed urine and fæces, and was very feeble. Next day passed some very albuminous urine, and a large amount of blood mixed with the fæces. The symptoms of general weakness increased and the hind legs began to drag; the movements were uncertain; the bloody purging grew worse, and it died on the third day. *After bite on back.*—Rabbit, **Ca** 26, p. 246, v. also ll. 21—26.

307. Local signs diminishing, but the animal had passed some very albuminous urine; and a large amount of blood mixed with the fæces. The bloody purging grew worse until death on third day. *Second day after bite on back.*—Rabbit, **Ca** 26, l. 5, p. 245.

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Pathogenetic Commentary.

Crotalus exerts an idiopathic action on the digestive tube throughout its whole length: producing, in the mouth and œsophagus congestion, hæmorrhage, œdema, and pain; in the stomach, thirst, want of appetite, eructation, nausea, vomiting, hæmorrhage, and pain; and in the bowels, congestion, inflammation, hæmorrhage, diarrhœa, dysen-

tery: the stools being frequent, liquid, bloody, dark, grey, involuntary; accompanied by tenesmus, and sometimes copious hæmorrhage; and frequently by nausea, vomiting, fainting, prostration. After death, in subacute and chronic cases, the mucous membrane of the whole intestinal tube is found to exhibit signs of congestion and inflammation, with extensive ecchymoses; and filled, especially the large gut, with blood and mucus. v. Ss. 290—293.

v. § 10, p. 155.

Therapeutic Application.

In accordance with these pathogenetic results and post-mortem evidences we may feel quite assured that Crotalus will be found of great service in the treatment of the following diseases, especially when occurring in connection with septic or zymotic disease:

Intestinal Hæmorrhage; especially when occurring during the course of septic or zymotic disease, such as variola, morbilli, typhoid fever; and when it is of hepatic, splenic, or cardiac origin; or from cancer, atonic ulcer, menstrual irregularities; or if the blood be dark, fluid, and uncoagulable. And it may, in such cases, be expected to even benefit the disease on which the hæmorrhage depends.

Diarrhœa; especially if it occur in connection with septic or zymotic disease, or result from noxious effluvia, or the imbibition of septic matters in food or drink; and therefore in diarrhœa from "high" game, and in "summer diarrhœa," English cholera, &c. S. 105, &c.

Dysentery; especially if of septic origin; from foul water; food, &c; and when characterised by excessive flow of dark fluid blood, or involuntary evacuations. Ss. 269, 300, 303, &c.

Varicosis, of the anus and lower bowel—idiopathic hæmorrhoids—particularly of the mucous membrane, and soft and thin, with great tendency to bleed on using paper, on a little straining at stool, or on standing.

Hæmorrhoids; particularly "bleeding piles," and especially when the blood is dark, thin, and little disposed to coagulate; also in pregnant women, and with menstrual irregularities, and connected with heart disease, liver disease, or the hæmorrhagic diathesis, in broken down constitutions, and in chronic inebriates.

Cholera.—The sudden and extreme coldness and blueness; the collapse, choleraic state, cramps and diarrhœa and vomiting; embarrassed respiration, scarcely perceptible pulse, suppression of urine, and speedy death or consecutive fever, afford very strong evidence in favour of the use of Crotalus in many cases of, at least sporadic if not true, Asiatic cholera; and it will certainly be indicated when the attack has resulted from septic influence. Ss. 19, 32, 57, 276, 408, 484, 583, 636, 637, 638, 645, 705, 706, 712.

Clinical Experience.

The reported clinical experience with Crotalus has not yet furnished many cures of morbid conditions of the rectum and stools, except in cases of yellow fever. The following case occurred in the practice of the present writer:

Hæmorrhage.—Mr. S—, aged 60, in October, 1882, on using paper after stool, noticed fluid on it; and on looking, found it was blood. Had noticed himself out of health and weak for some time; and with nausea and faint feeling. He consulted his usual (allopathic) attendant, who ordered first infusion of roses and sulphuric acid, then turpentine; and afterwards oak bark injections; all without benefit. In consultation, the leading physician in Liverpool said he failed to detect structural disease, that it was simply a case of hæmorrhage; and he increased the strength of the astringent injection. All, however, to no purpose; the hæmorrhage went on increasing. On being seen by the present writer, December 13th, 1882, it was found that the bleeding was dark and fluid, and occurred now also on standing and walking, appearing to be a simple oozing of dark fluid blood. The only other symptoms were debility, faintness, and some aching in left iliac region; with depression, anxiety, and lowness of spirits. Bowels, as a rule, rather relaxed. *Crt.* 3, ♏ j in water, every three hours; ordered early in the morning. December 14th.—Reports that all yesterday he felt as if a commotion were going on inside him, especially in left chest and left side of abdomen; he slept, however, at night better than he had done for years and felt much better of himself this morning, and found he had lost the aching pain he had in the left iliac region. Urine is free but high coloured, and muddy with lithates, which had not been the case for a long time. Had had a healthy stool preceded by some dark blood, and some blood was on the paper; there had been no oozing; and he felt wonderfully better himself. Continue *Crt.* 16th.—Reports that he feels wonderfully better; has had three stools, and with the last one scarcely any blood; and has had no oozing at all. 19th.—No evidence of blood yesterday or to-day. Continue *Crt.* three times a day. 30th.—Has had no evidence of bleeding, and feels quite well. Dr. Neidhard remarks:—"*Asiatic Cholera* made its appearance in July, when there were 134 cases; during August there were 252. Dr. Manzini alludes to the intimate connection of yellow fever and cholera, the second stage of the former of which often degenerated into the latter. *Among the inoculated* (with rattlesnake venom) *the cholera was very rare*, the inoculation acting as a preservative." The italics are Dr. N's. **III** *e*, p. 64, *ibid.*

Further evidence in support of the effectiveness of Crotalus in these diseases is afforded by the cures with the more familiar and very similarly-acting serpent venom, lachesis; with which many cures have been reported (v. *Jahr's New Manual*, ii, p. 42). Also by the cures with the other very similarly-acting serpent venom, naja. In a note by Dr. Fayrer, in his Thanatophidia, "On the use of Snake-Poison in Medicine," occurs the following: "In the collapsed state of cholera, it is successfully used. It is employed in dysentery and some complicated diseases." **III**, p. 148, *ibid.*

DR. BAYES says: "The 6th and 12th dilutions of lachesis will, in some cases, cure the chronic constipation of females, and that not unfrequent condition of alternate relaxation and constipation."—*Applied Homœopathy*, p. 109.

§ 13. Symptoms of Urinary and Sexual Organs (308—324).

v. § 9, p. 154.

308. Urine somewhat increased and of very high colour, a reddish yellow, on the second to the fifth day.—SCHMÖLE, C. H. 1601, **A** 1, p. 195.

309. During the night had to rise twice [ordinarily not requiring to rise at all] to urinate: urine copious and of light colour. *After five drops* 1^{x} *taken* 8.45 *a.m.*—HAYWARD, **A** 4, l. 14, p. 197.

310. Unusual excitement of sexual desire, only by day, with complete relaxation of the organs, indeed, apparent impotence.—LINGEN, C. H. 1624, **A** 1, p. 195.

311. Twice a sensation of cutting in glans penis.—LINGEN, C. H. 1580, **A** 1, p. 195.

312. v. S. 242. Catamenia a week too soon, free, preceded by weight in the head and ears, accompanied by pains in abdomen and back, and cold feet. The period lasts some hours longer than usual, and is followed by intense frontal headache, which lasts from ten to one o'clock in the night; and this night she had cramp in calf of one leg. *After pilule*, 4*th dil.*, *being fifth dose of the drug within nine days*.—S. E. S—, **A** 7, l. 31, p. 199.

313. After some topical inflammation (v. symp. 556), and some disturbance of circulation (v. symp. 391) and cerebration (v. symp. 10); in the evening became conscious that during the day urination had been seldom and urine scanty, and on rising next morning did not feel the usual necessity to urinate, and on attempting noticed that the urine passed the previous night and this morning together made but a small quantity, and looked concentrated, and was of very high colour; on testing it I found sp. gr. 1031, on boiling it became paler and of a greenish colour, but a little darker again on addition of nitric acid; remaining clear. Another portion, on addition of caustic potash, became milky, and on boiling became darker in colour and more green than with nitric acid, and the milkiness became a flocculent brown deposit—under microscope non-crystalline. The specimen boiled with caustic potash retained its greenish-yellow colour, but that with nitric acid lost it in half an hour. At 5.0 p.m. on this—the second—day urine appeared rather copious and of light colour, though had not drunk more than usual, sp. gr. 1014. Next day—the third—night and morning urine rather copious, sp. gr. 1018. Next morning urine appeared normal. On morning of fifth day urine clear and of normal quantity, sp. gr. 1020. Rheumatic pain existed all day in both wrists, elbows, and ankles. Morning of sixth day urine rather scanty, sp. gr. 1022; still some rheumatic pain about some joints. For next two days noticed great languor and

reluctance to rise in the morning. *After rubbing a little venom into scratch on wrist.*—HAYWARD, **B** 1, ll. 25—44, 49—52, 65, p. 203.

314. At different periods sexual excitement, erections at night. *For some time after inoculation.*—MANZ, **B** 3 *a*, l. 24, 48, pp. 205—6.

315. Within an hour violent vomiting, and at same time purging and urination. Vomiting, tenesmus, and strangury existed without intermission for nearly two hours. Thirst was excessive, and the water he drank was immediately ejected or passed in limpid urine; the quantity of urine secreted was really surprising. After two hours and a half the vomiting ceased, but he complained of pain in stomach and great thirst, and the tenesmus and micturition distressed him every few minutes. The extremities were cold, and the pulse weak and slow. Bloody mucus passed *per anum*, and he expectorated about half an ounce of a bright florid colour with the sputa. He was extremely restless, threw off all his clothes, and rolled about on the ground, the pain being concentrated at the epigastrium. His temperature was low, and his pulse small, slow, and sinking. *After a bite on heel.*—FRANCISCO, **C** 6, l. 25, *et seq.*, p. 214.

316. Copious and frequent urination. *Five and a half hours after bite on hand.*—MACH., **C** 29, ll. 50, 52, 61, 67, 73, p. 230.

317. Abortion: child dead; fifth month of pregnancy. *Five days after bite on foot.*—DETWILLER, C. H. symp. 1689.

318. Local signs diminishing, but the animal had passed some very albuminous urine, and a large amount of blood mixed with the fæces. *Second day after bite on back.*—RABBIT, **Ca** 26, l. 5, p. 245.

319. Acute congestion of kidneys. *P.M.*—DOG, **Ca** 10, l. 19, p. 242.

320. Urine albuminous. *P.M.*—DOG, **Ca** 7, p. 240, l. 32.

321. Urine bloody. *P.M.*—DOG, **Ca** 10, l. 20, p. 242.

322. The kidneys were full of blood and presented the appearance of acute congestion, and a long, thin clot was found in the left ureter and bloody urine in the bladder. *P.M. immediately after death.*—DOG, **Ca** 10, l. 20, p. 242.

323. The bladder was partially contracted, and held an ounce or two of slightly albuminous urine. *P.M. twenty-four hours after death.*—DOG, **Ca** 7, l. 31, p. 240.

324. The right kidney was large and absolutely soaked with dark fluid blood; the left kidney was more healthy. The bladder and ureters contained a good deal of bloody urine. *P.M.*—RABBIT, **Ca** 26, l. 27, p. 246.

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Pathogenetic Commentary.

On the urinary and sexual organs Crotalus produces first excitement, and secondly exhaustion and prostration. Urination is at first frequent and the urine copious, afterwards seldom and scanty; the urine becomes dark and of high specific gravity, albuminous, bloody; and sometimes copious hæmorrhage occurs; hæmaturia and albuminuria are, indeed, very constant effects. The sexual appetite is first excited and then depressed. The effect on the uterus appears to be to lower its vitality and engorge it with depraved blood, to the extent of producing hæmorrhage and abortion. Menstruation is made to occur too early, and to be too copious. After death, in subacute and chronic cases, the kidneys are found to present the appearance of acute congestion, or to be engorged with dark fluid blood, and the bladder to contain bloody or albuminous urine. The uterus does not appear to have been examined.

v. § 10, p. 155.

Therapeutic Application.

From the above pathogenetic effects and post-mortem evidences it is plain that Crotalus has an extensive and important sphere of usefulness in affections of the urinary and sexual organs; especially in chronic, congestive, relaxed, and exhausted states that have come on in the course of, or have followed, septic or zymotic disease.

The special diseases for which Crotalus is indicated are:

Nephritis albuminosa; especially when occurring in the course or any of the toxæmiæ, such as scarlatina, diphtheria, cholera, alcoholism; or in pregnancy, &c.; and it is particularly indicated when the urine has a dark smoky colour, from the escape of fluid blood (pho.); whilst cth. or ter. would come in when the hæmorrhage is bright. It would act well even at the onset of acute cases; arn. in chronic cases. It would replace aps. in the nephritis of pregnancy; and plb. would follow it well. Ss. 306, 318, 320, 390*a*, 708.

Passive Renal Congestion; especially when from embarrassed circulation, as from obstructive heart disease, asthma, chronic bronchitis, &c.; particularly during the course, or as a sequela, of zymotic disease.

Suppression of Urine; especially when occurring under the conditions noticed under the two former headings.

Hæmaturia; especially when occurring under the conditions noticed under the two first headings; or in connection with cancer of bladder or prostate.

Cystitis; especially of a passive congestive character, and particularly with hæmaturia.

Cancer of Bladder and Prostate; especially with much hæmorrhage.

Oophoritis; especially in hæmorrhagic constitutions, or connected with menorrhagia, or puerperal septicæmia.

Ovarian Abscess; especially under the conditions mentioned with oophritis.

Ovarian Neuralgia; especially when in the form of a pure neurosis; and at the climacteric, and accompanied with flushings, or pressing pain in vertex.

Menorrhagia; especially when occurring during the course of zymotic or septic disease; or other toxæmic states, as Bright's disease; or in hæmorrhagic diathesis; and particularly when the flow is of a dark, fluid, offensive character.

Vicarious Menstruation; especially in debilitated, depraved, cachæmic states of the system.

Miscarriage; especially during the course of septic or zymotic disease; and in nurses debilitated and exhausted by long nursing zymotic or septic patients; and from other blood-poisoning causes.

Leucorrhœa; especially if very offensive, or bloody, or occurring under the above-named conditions.

Lochia, abnormal; especially when very offensive, and particularly if this be from retained and decomposing matters, or from neglect of syringing, or from want of cleanliness.

After-Pains; particularly when connected with the above-named conditions of abnormal lochia.

Menopausia.—Flushings, perspirations; head troubles (throbbing, noises, giddiness); cardiac troubles, as sudden palpitations; "sinking at the stomach;" fainting at epigastrium, especially in weak, debilitated constitutions; or when there is metrorrhagia or other hæmorrhagic phenomena; and particularly if the blood be dark, fluid, offensive.

Noma Pudendi; especially if occurring in the course of zymotic disease, or other low, debilitated, degraded state of the body.

Cancer Uteri.—Fungoid, malignant sarcoma, cauliflower excrescence; especially with much tendency to hæmorrhage; and in very degraded states of the system.

Pelvic Hæmatocele; especially in connection with hæmorrhage, metrorrhagia, or other hæmorrhagic conditions, and in very debilitated and broken-down constitutions, or in the course of any of the toxæmiæ.

Puerperal Convulsions; especially when occurring in connection with albuminuria; torpidity; coma; blue, bloated countenance, or other sign of obstructed circulation; or under zymotic or septic influence; or in hæmorrhagic, or broken-down constitutions.

Metria (Puerperal Fever); v. "Fever," p. 361.

Phlegmasia Alba Dolens; especially in broken down constitutions, and after unfavourable parturition; and whether from extension of uterine phlebitis or from inflammation of the lymphatics.

Dropsy; v. "Generalities," p. 380.

Clinical Experience.

Clinical experience with Crotalus has not yet put on record many cases of cure in diseases of the urinary and sexual organs. The following cases have occurred in the practice of the present writer:

Hæmaturia.—Mr. S—, aged 58, the subject of asthma and with weak heart. After a chill had bronchitis, with extremely scanty urine, which was dark red with blood. Bel. 3 checked the bronchitis, but had no effect on the character of the urine. On the third day *Crt.* 6 was exhibited, every two hours. Marked improvement followed in the condition of the heart; and the urine became free from blood within three days. Mr. H—, aged 54, a similar case, but less inflammatory. Nux 3 improved the chest symptoms in three days, but had little or no effect on the character of the urine; *Crt.* 6 was now exhibited, every two hours; and the urine was free from blood within three days. Mr. L—, aged 18, generally of good health, had to work for some days in wet clothes; had an attack of lumbago with very scanty urine loaded with lithates. Under rhs. and ars., the lumbago passed off in three days, and the urine increased in quantity and became dark red with blood. Under *Crt.* 6 all traces of blood disappeared in four days. C. G—, aged 6. His brother had passed through mild scarlatina without much treatment. He had slight feverishness but no eruption; after some days his face became swollen, and puffed under the eyes; his abdomen large; and his urine smoky, and afterwards black, and under the microscope it proved to be loaded with dark ill-formed blood discs. *Crt.* 6 was ordered every two hours; and under it the urine became clear and all dropsical symptoms disappeared within a week. Curious to relate; after another exposure to scarlatina, after about six months, this boy went through a rather severe and well-marked attack of the disease; and was treated with *Crt.* 6. The urine became milky, but not bloody; and was soon put right with pho. 3.

Dysmenorrhœa.—Miss D—, aged 28, pale, weak, and strumous-looking. October 4th, 1882.—For the last two months very easily tired; tendency to diarrhœa; awakes in the morning with headache over eyes. For five days before menstruation has much pain in hypogastrium and down thighs, lasting during two first days of the flow; flow is very copious the three first days and then lingers on and off for four days more. Much dull, continuous, aching pain in region of heart, down left arm and through to left shoulder-blade, worse on drawing deep breath and going upstairs or a hill; bry. 3, four times a day. Oct. 21st.—Much the same; menstruation occurred with same symptoms; *Crt.* four times a day. Nov. 24th.—Menstruation came on

at proper time; was fairly natural and comfortable; much less of the tired feeling, no headache and scarcely any pain in chest, or tendency to diarrhœa. Continue *Crt.* 6, night and morning. The next menstruation came on at proper time, and without any disagreeable symptoms.

The more familiar and very similarly-acting serpent venom, lachesis, is one of the many very useful medicines we possess for urinary and menstrual troubles, v. *Jahr's New Manual*, ii, 43, 44. DR. C. WESSELHOEFT relates a case of *Amenorrhœa*, with severe aching pain in small of back; every two or three days acute labour-like pains low in the abdomen; and a hard aching pain, distinctly referable to the uterus. For weeks, great sleepiness; and sleep in the daytime aggravated the pains. Under lah. the abdominal pains soon subsided, the menses returned, and all the other troubles disappeared. *Brit. Jour. Hom.*, xxii, 492. For the menopausic "flushes" "we have," writes DR. HUGHES, "a valuable remedy in lachesis. Administered in the 6th or 12th attenuation it will rarely fail to reduce the trouble to a minimum, and to gain us the grateful thanks of our patient." *Therapeutics*, ii, 351. "DR. LOBETHAL says, that when after scarlet fever the accumulation of water extended to the thorax and pericardium, lachesis has cured, *particularly when the urine is black.*" *Amer. Hom. Rev.*, 1863, p. 560. DR. WOLF confirms this. *Ibid*, p. 562. DR. HUGHES says: "In ovarian abscess lachesis, first recommended by DR. HERING, has found several praisers." And speaking of ovarian neuralgia, he says: "DR. LUDLAM mentions naja as having proved useful; it has become my own favourite medicine for obscure ovarian pain, not frankly inflammatory." *Therapeutics*, ii, 279, 280.

§ 14. Symptoms of the Respiratory Organs (325—383).

v. § 9, p. 154.

325. Hoarseness and weakness of voice.—SCHMÖLE, C. H. 1737, **A** 1, p. 195.

326. Dry cough with tickling in throat, at night. *Third day.*—MARTIN, **A** 8, l. 6, p. 199.

327. Tickling in supra-sternal notch, as if in trachea, causing cough with expectoration. After a few days the tickling only, without the cough. —LINGEN, C. H. 1785, **A** 1, p. 195.

328. Larynx painful on being touched; second day.—SCHMÖLE, C. H. 930, **A** 1, p. 195.

329. Oppression in chest on sitting down almost causing fainting; second day.—SCHMÖLE, C. H. 1972, **A** 1, p. 195.

330. During several days there were soreness of chest, and cough in the evening. *Twenty-six days after pilule of fourth dilution, being fifth dose of drug in nine days.*—S. E. S., **A** 7, l. 38, p. 199.

331. A single violent sneezing, with a stitch in right side of chest near shoulder, followed by pains in sternum.—SCHMÖLE, C. H. 1693, **A** 1, p. 195.

332. In middle of chest, rather to right side, a sharp sore pain and shooting, as if through the sternum, increased by pressure, but not by deep breathing; first day.—SCHMÖLE, C. H. 1897, **A** 1, p. 195.

333. Continuous dull stitch in front of chest as far as left shoulder, after quarter of an hour; it returned the following day.—SCHMÖLE, C. H. 1898, **A** 1, p. 195.

334. Stitch in right side of chest close to sternum.—SCHMÖLE, C. H. 1895, **A** 1, p. 195.

335. Pain in right side under arm, then same in left.—SCHMÖLE, C. H. 1858, A 1, p. 195.

336. Throbbing bruised pain under right arm on the ribs, and at same time pain in right elbow.—SCHMÖLE, C. H. 2134, A 1, p. 195.

337. Pain under left arm passing into left side of chest, much aggravated by deep breathing.—SCHMÖLE, C. H. 1859, A 1, p. 195.

338. Pain in left breast, and next day pain in right.—KUMMOR, C. H. 1863, A 1, p. 195.

339. In front of shoulder-joint, above axilla, several small soft tubercles under skin, and many continuous stitches as if from pins sticking into the flesh; worse on bending arm backwards; second day.—SCHMÖLE, C. H. 2094, A 1, p. 195.

340. Sudden pain over left nipple as if from a blow lasting two minutes, and recurring after a few minutes; first day.—SCHMÖLE, C. H. 2025, A 1, p. 195.

341. In a Sister of Charity, inoculated, there was a complete pleurisy, with fever of a remittent type.—MANZ, B 3*a*, l. 70, p. 206.

342. The frog was seated and quiet; and no respiration occurred during half an hour. *Twenty-one hours after insertion into back of small quantity of dried venom.*—B 6, l. 3, p. 207.

343. With much muscular twitching of limbs, there was a peculiar twitching of diaphragm, not synchronous with respiratory movements; slower at first but afterwards at the rate of 150 per minute. It began fourteen minutes after injection of venom into jugular vein and continued till near death, at the end of one hour and a half.—CAT, B 15, l. 9, p. 210.

344. Voice indistinct. *Three and a half hours after bite on hand.*—LOBDELL, C 18, l. 6, p. 221.

345. Constriction of throat and embarrassment of breathing. *Four hours after bite on hand.*—MACH., C 29, l. 47, p. 230.

346. Respiration anxious [approaching dissolution]. *Twenty-two hours after bite on hand.*—MACH, C 29, l. 91, p. 231.

347. Respiration difficult; and he had difficulty in swallowing liquids; he could drink, but only a little at a time. *Four and a half hours after two bites on hand.*—DRAKE, C 28, ll. 44, 129, p. 227.

348. Respiration difficult and hurried; continuing so for two days. *Ten hours after bite on finger.*—BURNE, C 15, ll. 6, 9, p. 218.

349. Face drawn, voice very weak, tongue with white fur; considerable oppression and anxiety; pulse 110; said his blood was suffocating him, and begged to be bled, and expressed relief after application of three leeches to front of neck. Drinks had to be given him in a spoon, and he kept them in his mouth a long time; and only after painful effort could he swallow them. *Seven and a half hours [an hour and a quarter before death] after two bites on hand.*—DRAKE, C 28, ll. 46, 129, p. 228.

350. Along with intense local pain and terrible nervous agitation (S. 16), the respiration was quick and laborious; pulse weak and 115; and the surface covered with cold sweat. *Four hours after bite on hand.*—CHAS. S—, C 16*a*, l. 11, p. 220.

351. Respiration slow and laborious; pulse irregular, trembling and

scarcely perceptible. *Ten minutes after bite on cheek.*—CHILD, C 27, l. 8, p. 226.

352. First day cold surface, coma, imperceptible pulse, slow heart-beats, and slow and laboured respiration. Second day cough, lasting for the day, with expectoration of bloody mucus. Tongue swollen to nearly double its normal size, and several bloody stools. *After bite on hand.* IRISHMAN, C 7, p. 215.

353. Nearly comatose, surface cold, pulse imperceptible, heart beats 55, respirations 14 and laboured, constant vomiting. *Five hours after bite on hand.*—IRISHMAN, C 7, p. 215.

354. Eyes closed and pupils contracted, with extreme prostration and stertorous breathing, and scarcely perceptible pulse, weak, and only fifty. *Half an hour after two bites on hand.*—DRAKE, C 28, ll. 13, 21, p. 226.

355. Sudden paleness of face, and on attempting to sit down he fell over. There was relaxation of the muscles, and total loss of movement and power, his head hung upon his chest; there was stertorous breathing, syncope, and involuntary evacuation of urine and fæces, with cold extremities. *Twenty-five minutes after two bites on hand.*—DRAKE, C 28, l. 10, p. 226.

356. Shortly after bite on foot the head and face became prodigiously swollen and the latter black; his tongue was proportionately enlarged and protruded out of the mouth; his eyes were as if shooting from their sockets, his senses were gone, and there was every appearance of immediate suffocation.—MAN, C 17, p. 220.

357. Great oppression of chest, with evident inflammation of lungs and of the bowels. *Ten hours after bite on toe.*—WOMAN, C 13, l. 16, p. 218.

358. Oppression of chest, and violent burning pain in trunk, increased by touch. *Fifteen minutes after bite on foot.*—WOMAN, C 12, l. 4, p. 217.

359. Feeling of knot in throat and great pain in chest [this latter lasted for three hours]. *Seven hours after bite on hand.*—MACH., C 29, l. 57, p. 230.

360. Next day after a bite on hand the arm began to diminish in size, and the ligature round arm was loosened, but within two hours all the side of body turned black, he bled at the mouth, and became feverish; he continued feverish and spitting blood for four days.—BRNTL., C 16, l. 26, p. 219.

361. Great pain about chest, pulseless, and vomiting green fluid; relieved by alcohol. *A few hours after bite.*—NEGRO, C 11, l. 2, p. 217.

362. At fifteen minutes after he lay down much weakened, with quickened pulse and respiration. These symptoms increased, so that at fiftieth minute he had lost the power in his hind legs. *After bite on thigh.*—DOG, Ca 6, ll. 6, 11, p. 239.

363. Pulse quickened (160) and respiration quickened (45) and laborious. *Forty-five minutes after bite on thigh.*—DOG, Ca 6, l. 11, p. 239.

364. Heart very feeble, breathing laborious, pupils contracted; character of respiration singular, eight or ten rapid respirations and then a

pause for twenty seconds. *Five minutes after second bite in neck.*—Dog, **Ca** 7, l. 9, p. 240.

365. Respiration occasionally jerky, heart's action rapid and feeble, weakness and incessant thirst. *Two hours after bite on thigh.*—Dog, **Ca** 4, l. 5, p. 238.

366. Breathing in jerks and twitching in almost every muscle, with whining and debility. *After bite on shoulder.*—Dog, **Ca** 5, l. 4, p. 238.

367. Heart could scarcely be felt to beat, and respirations were long and laboured. *During first hour after bite on shoulder.*—Dog, **Ca** 5, l. 6, p. 238.

368. Heavy breathing. *Within half an hour after two bites.*—Dog, **Ca** 10, l. 6, p. 242.

369. Lying on floor, scarcely breathing and nearly pulseless, mind apparently unaffected. *Seven hours after bite on shoulder.*—Dog, **Ca** 5, l. 7, p. 238.

370. Moved into a corner and sat down, panting and breathing laboriously; appeared restless, moved about for a while, and then sat down and closed her eyes. Then pawed at throat and mouth as if they were uncomfortable, mewed weakly, breathed quietly and closed her eyes; after two minutes more respiration became quick; she afterwards stretched herself out and lay quiet. *A few minutes after one drop of* 1^{x} *injected under skin.*—Kitten, **B** 3, ll. 8, 16, p. 207.

371. Within two minutes trembled all over and breathed very rapidly. *After five drops* 1^{x} *injected under skin.*—Kitten, **B** 3, p. 207.

372. Within two minutes unable to stand, gasping respiration and fixed expression of countenance. *After bite.*—Wolf, **Ca** 14, p. 243.

373. Seized with weakness, gritting of teeth, and rapid respiration. *A few minutes after bite on back.*—Rabbit, **Ca** 26, l. 1, p. 245.

374. Sudden loss of motor power, prostration, gasping, very quick respiration, pulse rapid and feeble. *Shortly after bite on neck.*—Rabbit, **Ca** 29, l. 2, p. 246.

375. It rolled over, gasping and slightly convulsed, and was dead in one minute. *After bite on paw.*—Rabbit, **Ca** 25, p. 245.

376. The bird fell down and immediately began to breathe convulsively, now and then gasping and making efforts to rise. *Three minutes after bite on back.*—Pigeon, **Ca** 15, l. 3, p. 243.

377. It became more and more feeble, and the breathing more laboured. *Five minutes after bite on back.*—Pigeon, **Ca** 15, l. 6, p. 243.

378. During half an hour no respiration occurred, though on touching the eye it breathed once and moved its entire body. *Twenty-one hours after insertion into muscles of back a little dried venom.*—Frog, **B** 6, l. 4, p. 207.

378 *a*. Jerking respiration, common.—Rabbits, Mitchell, p. 68.

378 *b*. Very quick respiration.—Rabbits, Mitchell, p. 68.

378 *c*. Respiration quick and laboured.—Rabbits, Mitchell, p. 68.

379. Both lungs contained large extravasations of dark blood, soaked through their tissues to such an extent as to make it impossible to say whether or not it was fluid or coagulated. P.M. *after inspiration of two drops of pure venom with water.*—Pigeon, **B** 4, l. 9, p. 207.

380. The blood was diffluent in every locality examined, and the left

lung contained a large extravasation of dark blood. *P.M. after inspiration of two drops of fine venom with water.*—PIGEON, B 5, l. 4, p. 207.

381. The mucous membrane of the windpipe and of the bronchi was notably injected. A patch corresponding with the cricoid cartilage was, indeed, inflamed. The trachea and bronchi were filled with reddish frothy serum. The lungs throughout were crepitant, but presented the first stage of sanguineous engorgement. *P.M. twenty-four hours after death from bite on hand.*—DRAKE, C 28, l. 129, p. 228.

382. Pluræ congested. *P.M. next day after death.*—DOG, Ca 13, l. 10, p. 243.

383. "Lungs deeply congested and much ecchymosed. Deep-red gelatinous effusion all about root of lungs." *After injection into jugular of gr. ¼ dissolved dried venom.*—B 15, l. 21, p. 210. *P.M.*

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Pathogenetic Commentary.

Direct and idiopathic actions by Crotalus on the nerves and muscles of respiration, and on the bronchial and pulmonary mucous membrane, and the substance of the lungs, are well and distinctly shown during life, and made evident after death. During life by the rapid or slow, anxious, laboured, embarrassed, interrupted, jerking, convulsive, panting

or difficult respiration, with tickling, soreness, and sensitiveness of the larynx; cough, bloody expectoration; sneezing and coryza; and oppression, constriction, soreness, stitching and painfulness of the chest, aggravated by forced respiration; many of which symptoms are contingent, being altogether independent of the dose. After death, in subacute and chronic cases, the mucous membrane of the trachea and bronchi is found congested, inflamed, and filled with reddish frothy mucus; and the lungs throughout present the first stage of sanguineous engorgement, are deeply congested, and contained deep red gelatinous effusion about their roots. The pleuræ, too, are congested, and show patches of ecchymosis. These results are very similar to those found after death from bronchitis and pneumonia, especially as occurring in typhus fever. v. Ss. 381, 382, 383, 433.

v. §10, p. 155.

Therapeutic Application.

In accordance with the indications afforded by these evidences Crotalus will be found a very valuable remedy in the treatment of many of the morbid states of the respiratory organs; of the trachea, bronchi, lungs, pleuræ, and chest.

For its relation to the diseases of the first part of the respiratory tract, v. "Nose," and "Throat;" and for those of the Heart v. "Circulatory Organs."

The special diseases of the respiratory organs in which Crotalus is most plainly indicated are:

Bronchiectasis,—putrid bronchitis, chronic bronchorrhœa—especially in broken-down or hæmorrhagic constitutions; and particularly if there is a tendency to gangrene.

Asthma; especially with cardiac disease; and particularly when there is great debility and prostration, with blue, puffy countenance, and cold sweat.

Pneumonia—notha—and especially when occurring in typhus and other fevers, or septic disease, or in inebriates or broken-down constitutions, and where there is a tendency to gangrene or hæmorrhage.

Œdema Pulmonum; especially in the course of the zymotic or septic diseases, and in old persons, inebriates, and broken-down constitutions.

Gangrena Pulmonum; especially with asthenic pneumonia or bronchitis, and in the course of septic or zymotic disease, and in inebriates and old persons.

Cancer Pulmonum; especially with much hæmorrhage or fetor.

Abscessus Pulmonum; especially with tendency to gangrene, or with typhoid symptoms, and in broken-down constitutions.

Hæmorrhage, Hæmoptysis; especially in connection with gangrene, cancer, œdema, abscess, and any other low debilitating condition; or the hæmorrhagic diathesis.

Cough; especially in connection with any of the above states; also

in phthisis when incessant and apparently from nervous sensitiveness and irritability; also with the characteristics noticed under "Nervous Cough." v. "Throat, p. 287."

Pertussis; especially when there is great debility, and much cardiac weakness, with blueness or pallor of countenance after an attack, and tardy return to the natural colour; and when the attacks are followed by puffiness of the face, or hæmorrhagic spots, purple lips, bloodshot eyes, epistaxis, or much frothy, stringy, sanguineous expectoration; and when there is any threatening of pulmonary œdema or paralysis.

Hydrothorax; especially in broken-down constitutions, whether secondary dropsy or left by pleurisy; and particularly if connected with weak heart, albuminuria, menstrual irregularities, or hepatic disease.

Clinical Experience.

There has not yet been recorded much clinical experience with Crotalus in the treatment of diseases of the respiratory organs. The present writer has frequently used it in *Pertussis*, marked by the characters and accompaniments mentioned under this head, and with rapid and remarkably beneficial results. And DR. ATCHISON records the following case: "The most interesting feature of this case [the case of Miss R., v. 15, p. 213] remains to be told: Miss R., at the time she was bitten, was the subject of well-marked hooping cough, which was then epidemic in the neighbourhood; she had had the disease about three weeks, consequently it was at its acmé; but on recovering from the effects of the poison (within about twenty-four hours), to her great surprise and gratification, her cough had disappeared also; nor did it return." DR. LILIENTHAL says: "DR. HILBERS, of England, has much confidence in Crotalus as alleviating symptoms in phthisis, especially the *cough;* and lachesis shows a remarkable power of allaying the cough of pulmonary abscess and phthisis." *North Amer. Journ. Hom.* xvi, 504. Crotalus is also reported to have cured *Pneumonia;* and to have "greatly relieved the excessive oppression of the chest in old people affected with hydrothorax;" and "oppression of the chest in fever and ague," v. *Jahr's New Manual*, i, 617.

Further evidence in support of the curative power of Crotalus in affections of the respiratory organs, is afforded by the many cures recorded with the more familiar and very similarly-acting serpent venom, lachesis; there being perhaps very few of these in which it has not been exhibited, and that with an immense amount of success, v. *Jahr's New Manual*, ii, 45-6-7-8. DR. C. WESSELHOEFT records a case of cough:—A girl, five years of age, with caries of the spine and very troublesome cough, especially bad at night, with febrile excitement and thirst; respiration feeble and difficult, with blueness of face; each paroxysm of cough producing perspiration; expectoration impossible; and sleep much interrupted. Lachesis 30 produced a rapid and marked improvement in all the symptoms. *Brit. Journ. Hom.*, xxii, 481. DR. C. HERING records the case of a young man of phthisical habit of body who had suffered from *Pneumonia* in the autumn, and, as happens in half the number of cases after severe depletion, he pined away; he came to me in spring quite emaciated, and suffering from a constant cough—short, superficial, tickling, very exhausting, sometimes causing vomiting. Lachesis soon cured him. *Brit. Journ. Hom.*, ii, 377. For cases of cough, bronchitis, pneumonia, and asthma, cured

with lah., v. *Amer. Hom. Rev.*, 1863, p. 559, 560. DR. C. W. BOYCE gives four cases of bronchitis cured with it: *ibid.* 1864, p. 415. DR. BAYES says: "The cough symptoms of lachesis are also prominent, and in laryngeal coughs it often acts very promptly. It also will check and often cure with rapidity the excessive vomiting in whooping-cough. Suffocative fits of cough of uncertain origin will often yield to lachesis. There is one other form of cough in which lachesis has proved almost invariably curative, *i.e.* after a long, dry, and wheezing paroxysm of cough, suddenly there is a profuse expectoration of frothy, tenacious mucus, the expulsion of which gives great relief." *Applied Homœopathy*, p. 109. And yet further evidence is afforded by the other very similarly-acting serpent venom, naja, of which DR. RUTHERFORD RUSSELL says: "It relieves dyspnœa and prostration in organic disease of the heart." *Brit. Journ. Hom.*, xi, 598. And DR. BRADSHAW gives two cases of *Phthisis* in which Crotalus and naja were of marked service. *Annals of Brit. Hom. Society*, i, 298—9.

§ 15. Symptoms of the Circulatory Organs (384—440).

v. § 9, p. 154.

384. Much palpitation and trembling of heart, and feeling as if heart tumbled about; with heat and itching of palms, and flushing of heat throughout body; lasting whole day, and worse next morning, so that she refused to take any more of the drug. Accompanied by sorethroat (v. Sym. 190). *Whilst taking three drops every two hours 3rd dil.*—E. J. H., **A** 5, l. 4, p. 197.

385. Feeling of exhaustion at heart, and sensation as of jumping out or tumbling over; with a general weak feeling. *Several times during taking three drops four times a day for two weeks 3rd dil.*—M. J., **A** 6, l. 5, p. 198.

386. A weak trembly condition of heart, continuing for some days. *After taking three drops every two hours for twenty-four hours 3rd dil.*—E. J. H., **A** 5, l. 10, p. 198.

387. The effect was soon to diminish the pulse; three doses so reduced the pulse and depressed the whole system, that, for fear of collapse, powerful stimulants had to be resorted to. *Fractional doses of pure venom.*—OATES, **A** 10, l. 13, p. 200.

388. Great diminution of pulse and depression of whole system—threatening collapse. *After three pills containing pure venom.*—OATES, **B** 10, l. 15, p. 200.

389. Feeling of soreness in pericardium, lasting a few minutes; followed in quarter of an hour by similar feeling along cartilages of ribs in epigastrium, also lasting a few minutes. *Fifteen minutes after second dose of five drops of 3rd atten.*—HAYWARD, **A** 3, l. 4, p. 196.

390. Slept heavily and dreamt much, and on awaking in the morning felt as if brain were contracted and lay loose within skull and fell about on moving head, and as if it were tender or morbidly sensitive, so that a pulsative headache was felt synchronous with pulse, as if brain were somewhat grasped; also a tenderness of the heart on turning to lie on left side, as if pericardium were morbidly sensitive. These two symptoms continued for over an hour, and went away whilst dressing. *First night after five drops each of 3rd atten.*—HAYWARD, **A** 3, l 14, p. 196.

390a. Along with great irritability of temper (S. 6*a*) and sensitiveness to noise (S. 160*a*), she noticed the appearance of dark red spots under the nails of the fingers and toes, and in the skin of different parts of the body, especially the legs; under the mucous membrane of the mouth; and in the conjunctivæ—the eyes became bloodshot. On blowing the nose or coughing there would be blood on the handkerchief, and on wiping the ears after washing there would be blood on the towel. The spots under the nails appeared as if blood would issue out at the finger ends. The stools also were bloody, and the urine of a dark, smoky colour. *Whilst taking* 1^{x}, *three drops four times a day.*—MRS. B., **A** 6*b*, l. 12, 198.

391. After some topical inflammation (v. symp. 556), in ten minutes attention was arrested by a sudden dig at the heart; and, on feeling, found my pulse beating ten more than normal; after another five minutes noticed a quivering sensation in epigastrium, with slight nausea; after another fifteen minutes found pulse had fallen to ten below normal; was small, soft, empty, and very easily compressible; there were frequent sneezings and much catarrhal irritation in nose, with a faint, sinking sensation in epigastrium. Next day urinary troubles (v. symp. 313); and on fourth day headache on awaking (v. symp. 113); and on a little exertion heart beat rapidly, and with that there was an aching at point of left scapula; these subsided soon after exertion was over. The morning headache recurred on fifth and sixth day; and on sixth and seventh days there was difficulty in spelling (v. symp. 10). Early in morning of sixth day, on turning to lie on left side—usual side for lying on—felt as if whole heart were very tender, so that I could not lie on that side, though I tried several times. Next few mornings was very languid and reluctant to rise; and for two or three weeks afterwards was weak and not equal to much exertion; which would bring on palpitation and dyspnœa, especially on ascending a hill. *After rubbing a little venom into scratch on wrist.*—HAYWARD, **B** 1, ll. 11—17; 52—80, p. 202.

392. Pulse made either too frequent or too slow, especially the latter; stronger or weaker than natural, especially the latter. *Seven hours after inoculation.*—MANZ, **B** 3*a*, ll. 7, 29, 52, p. 205.

393. Pulse was increased in fulness. *Forty minutes after bite on hand.* MACH., **C** 29, l. 19, p. 229.

394. Increased frequency of pulse. *Two hours after bite on hand.*—MACH., **C** 29, l. 38, p. 229.

395. Pulse 120, small, quick and thread-like. *Eight hours after bite on ankle.*—NEGRESS, **C** 14, l. 3, p. 218.

396. Pulse began to flag, and it became less full and forcible, and increased in frequency to 100 and afterwards 120; and became constantly more and more feeble to complete extinction. *Four hours after bite on finger.*—WAINWRIGHT, **C** 30, l. 24, p. 231.

397. Pulse low, and about 60. *Twenty-four hours after two bites on foot.*—BIGGS, **C** 2, l. 13, p. 212.

398. Pulse very weak, and ranging from 115—130. *Ten hours after bite on finger.*—BURNE, **C** 15, l. 5, p. 218.

399. Pulse very feeble. *Five hours after bite on thumb and finger.*—SOPER, C 33, l. 10, p. 234.

400. Very feeble, fluttering, and scarcely perceptible pulse. *Shortly after bite.*—ESSEN, C 10, l. 5, p. 217.

401. Pulse intermittent and very rapid (approaching death); convulsions increased; deglutition extremely difficult; and respiration anxious. *Twenty-two hours after bite on hand.*—MACH., C 29, l. 94, p. 230.

402. His pulse 80, firm, but irregular; and he was sensitive to the least noise. *Three and a half hours after two bites on hand.*—DRAKE, C 28, l. 35, p. 227.

403. Pulse irregular, trembling, and scarcely perceptible; respiration slow and laborious. *Ten minutes after bite on cheek.*—CHILD, C 27, l. 8, p. 226.

404. Pulse almost imperceptible and thread-like, with cold extremities. *Eighteen hours after bite on arm.*—LAKE, C 26, l. 11, p. 225.

405. Pulse wavy and scarcely perceptible (recovered by whiskey and ammonia). *Two and a half hours after bite on instep.*—MISS R., C 5, l. 4, p. 213.

406. Pulse scarcely perceptible at wrist; the fainting fits were more or less frequent; and the vesications and red spots were increased in size. *Thirty-two hours after bite on thumb and finger.* SOPER, C 33, ll. 46, 139, pp. 235—6.

407. Pain and stricture at epigastrium; great restlessness and anxiety: cold skin, except on the wounded extremity; the arm was very painful; delirium, singultus and difficult breathing; and scarcely perceptible pulse. The back of hand was blackish and much swollen; and skin of forearm was hot and tense. *Five hours after bite on finger.*—STEEL, C 22, ll. 15—21, p. 221.

408. Along with some delirium and drowsiness, and great effect on hearing and vision; "there was no pulse at the wrist, but auscultation showed the heart to be beating about 100 per minute, with feeble impulse, and remarkable shortness of the systo-diastolic interval. The respirations were rapid, 30 per minute. The skin of the extremities was dry and cool, but not cold. The temperature in left axilla was 96·4° F." There were also repeated vomitings, some watery diarrhœa, and occasionally great restlessness, and some twitching. Under stimulants, reaction set in within about five hours, and then the lad complained of headache, and after this he had two convulsions; the temperature rose to 97·1° F. He afterwards complained of great pain in the chest; and the pulse almost disappeared again at the wrist, continuing 100. The pulse and respiration continued the same until death, which took place at the twenty-ninth hour, quite suddenly, "all at once, when least expected." *Three hours after a bite on hand.*—JEF., C 30*a*, l. 23, 65, 77, pp. 232—3.

409. Great pain about chest, pulseless, and vomiting green fluid, relieved by spirits. *A few hours after bite.*—NEGRO, C 11, p. 217.

410. Blood flowed immediately from both fang-punctures, and the parts became tumid and livid. The bleeding continued profuse for many hours, and the blood appeared to have no disposition to coagulate. *After bite on finger.*—STEEL, C 22, l. 9, p. 221.

411. The pulse, which before the poisoning was 154, rose immediately after the bite to 175. When she fell it was about 160, irregular and feeble; after this its force diminished gradually, but the rhythm changed very little until just before death [80th min. after bite] when it fell rapidly. *After two bites.*—Dog, Ca 9, l. 10, p. 241, v. 566*e*.

412. Heart's action rapid and feeble; respiration occasionally jerky; weakness, and incessant thirst. *Two hours after bite on thigh.*—Dog, Ca 4, l. 5, p. 238.

413. He lay down much weakened, pulse much quickened (160) and feeble, and respirations quickened (40). *Fifteen minutes after bite on thigh.*—Dog, Ca 6, l. 6, p. 239.

414. Heart very feeble, breathing laborious, pupils contracted. The heart-beat, previously 180 to the minute, fell, at the fifteenth minute, to 80 and became remarkably feeble. At the seventeenth minute the respiration stopped; and the heart pulse, though so weak as to be counted with difficulty, rose to 156, falling again at the twenty-fourth minute to 58, when it became indistinct from weakness, previous to death. Pupils then dilated. *After a second bite in neck.*—Dog, Ca 7, l. 9—17, p. 240.

415. His pulse, which was naturally about 145 and irregular, was, at the fifth minute, 140 and regular; respiration 35. At the fifteenth minute, pulse 160 and feeble, and respiration 40. At forty-fifth minute, pulse 160 and more feeble; respiration 45 and laborious. At eighteenth minute respiration quick and laboured, and so irregular as to make it impossible longer to count the heart pulses. *After bite on thigh.*—Dog, Ca 6, l. 5—14, p. 239.

416. Lying on floor, scarcely breathing, and nearly pulseless, mind apparently unaffected. *Seven hours after bite on shoulder.*—Dog, Ca 5, l. 7, p. 238.

417. The heart-beat, which after the bite was strong and rapid, became scarcely perceptible. *Within an hour and a half after two bites.*—Dog, Ca 10, l. 10, p. 242.

418. Blood ran freely from the wound for the first half hour. *After a bite on inside of thigh.*—Dog, Ca, 9, l. 6, p. 241.

419. From one of the wounds blood immediately ran in a thin stream; after it had run for some time it was found to coagulate well. . . . . After an hour pulse was quick and feeble, and respiration occasionally panting. Hæmorrhage had ceased. Blood drawn again, after four and a half hours, coagulated well. . . . After twenty hours gums were bleeding; and eyes deeply injected. Blood was found very dark, and to form clot of feeble texture. After three more hours no clot at all would form. . . . On fourth day his blood again exhibited a clot, though very small and of loose texture. He gradually recovered. *After double bite on flank.*—Dog, Ca 5*a*, ll. 2, 7—18, 28, p. 239.

420. The heart loses power in the first stage of Crotalus poisoning; and the constant arterial pressure undergoes a rapid and singular diminution.—Mitchell, p. 85, l. 7 from bottom.

421. In most of the cases of acute poisoning the rhythm and force of

the heart became affected before the respiration is suspended.—MITCHELL, p. 80, l. 15.

422. The exterior part of the loose fold of pericardium, where it is exposed on elevating sternum, was dry, resembling dried bladder. The cavity of pericardium contained about half an ounce of serous fluid, which had a frothy appearance. On cutting into the aorta a small quantity of fluid escaped, and had a smilar appearance. The cavities of the heart contained coagulated blood. *P.M. sixteen hours after death from bite on hand.*—SOPER, C 33, l. 137, p. 236.

423. The pericardium contained about an ounce and a half of bloody serum. *P.M. twenty-four hours after death.*—DOG, Ca 7, l. 28, see also *P.M.*, DOG, Ca, 9, l. 28, p. 242.

424. The pericardium was curiously distended with bloody serum. The heart was contracted and contained but little blood, and that was dark and diffluent. *P.M.*—RABBIT, Ca 26, l. 19, p. 246.

425. The heart was relaxed, right side full, left nearly empty. The blood in both sides and everywhere else in the body was perfectly fluid and free from clots. Placed in a phial it remained fluid until decomposition ensued. *P.M. shortly after death.*—DOG, Ca 6, l. 30, p. 240; see also *P.M.*—DOG, Ca 7, l. 26, 28, p. 240.

426. The veins of the arm of the bitten hand contained no blood below the elbow, from the elbow as far as the axilla they contained disseminated clots. In the clavicular extremity of each axillary vein commenced a clot, moulded to the interior of the vessel and reaching as far as the junction of the hepatic vein with the vena cava inferior, passing by the right auricle of the heart; a large clot also filled the left auricle spreading into the pulmonary veins. *P.M. twenty-four hours after death from bite on hand.*—DRAKE, C 28, l. 116, p. 228.

427. The blood was universally fluid. *P.M. four hours after death from bite on arm.*—LAKE, C 26, l. 27, p. 225; v. also *P.M.*, DRAKE, C 28, l. 102, p. 228.

428. There was very little blood in the heart, perhaps having run out from its fluidity. *P.M. four hours after death from bite on arm.*—LAKE, C 26, l. 34, p. 225.

429. Under the microscope the blood taken from aorta and other vessels showed large oil drops; and the corpuscles did not form rouleaux. And that which flowed from a vessel in the cerebrum broke up into crystalline masses, resembling hæmatin. *P.M. shortly after death from bite on back of neck.*—GUINEA-PIG, Ca 24, l. 14, p. 245.

430. The pericardium contained a little bloody serum. The heart was marked over the right ventricle with three star-like spots of ecchymosis, and a little ribbon of extravasated blood ran along each side of several of the smaller coronary veins. *P.M. immediately after death.*—DOG, Ca 9, l. 28, p. 242.

431. The heart was congested, and the aorta contained dark fluid blood. *P.M. shortly after death in three minutes from bite on back of neck.*—GUINEA-PIG, Ca 24, l. 17, p. 245.

432. Heart and its vessels stretched with blood, and the contained blood about the consistence of cream. *P.M. next day after death.*—DOG, Ca 13, ll. 11, 15, p. 243.

433. The lungs, the venæ cavæ, the right side of the heart and the pulmonary artery were filled with blood. *P.M. three hours after death.*—CHILD, C 27, p. 226.

434. The heart contained an abundance of blood, chiefly fluid; with a number of small clots, of very loose structure, in the right side and somewhat less in the left cavities. In the pericardium there was about an ounce and a half of bloody serum. *P.M.*—DOG, Ca 7, l. 26, p. 240.

435. The right heart was filled with fluid blood. The left heart also contained more blood than usual, and its colour was a little brighter than that of the other side. *P.M.*—DOG, Ca 8, l. 14, p. 241.

436. The heart as usual, the right side full of fluid blood, with some loose dark clots, the left side almost empty. *P.M.*—DOG, Ca 10, l. 16, p. 242.

437. "The blood taken from heart and great vessels did not coagulate, though very florid in colour. Examined under microscope, nearly two hours after apparent death, the white corpuscles appeared natural, the red corpuscles not in rouleaux and very much crenated, though a few retained their natural contour. The blood was neutral to test-paper." *After injection into jugular of gr. ¼ dissolved dried venom.*—RABBIT, B 14, l. 14, *P.M.*, p. 210.

438. Blood from heart and great vessels did not form a coagulum, but remained permanently fluid. The red corpuscles were much crenated. *After injection into jugular of gr. ¼ dissolved dried venom.*—CAT, B 15, *P.M.*, l. 27, p. 210.

439. Effects of the venom on the blood:—Blood was extracted from a finger and placed under the microscope; on the smallest quantity of venom being presented to the blood between the glasses a change was immediately perceived—the corpuscles ceased to run and pile together, and they remained stagnant, without any special alteration of structure. The whole appearance was as though the vitality of the blood had been suddenly destroyed, exactly as in death by lightning. This agrees with another experiment performed on a fowl, in which the whole mass of the blood appeared quite liquid, and had but little constitutable power."—W. J. BURNETT, M.D. *Paper read before the Boston Society of Natural History: Pharmaceutical Journal, England*, xiii, p. 631.

440. The heart was relaxed, the right side full, the left nearly empty. The blood in the right side was a little darker than that in the left, in both sides and everywhere else it was perfectly fluid and free from clots. Placed in a vial it remained fluid until decomposition ensued. Two hours after death some of the blood globules found in the heart were slightly indented, those taken from the ears were perfectly normal. *P.M. shortly after death.*—DOG, Ca 6, l. 35, p. 240.

See §§ 285, 286.

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Pathogenetic Commentary.

Crotalus affects profoundly the *vagi* at their origin, and it thus interferes *indirectly* with the heart's innervation, and with the blood-formation. Besides these it affects *directly* and idiopathically the heart and blood-vessels themselves, and their ganglionic nerves; as also the blood itself and its fibrine, destroying the latter. "In the first stage of Crotalus poisoning," says Dr. Mitchell, "the heart loses power, and the constant arterial pressure undergoes a rapid and singular diminution. . . . In most of the cases of acute poisoning the rhythm and force of the heart become affected before the respiration."—MITCHELL, p. 85.

In consequence of this universal and devitalising effect, the heart's impulse becomes very feeble and its systolic sound indistinct, as in typhus; its movements become tremulous, fluttering, irregular, the arterial pressure is diminished, the pulse becomes very rapid or slow, very feeble, soft, small, thread-like, trembling, irregular, intermittent, scarcely perceptible, indeed not to be felt at the wrist. The

heart and pericardium become tender, and there is a sensation of impending suffocation, as if from stagnation of blood in the lungs, with a tendency to dizziness, and to fainting and vomiting on assuming the upright position or attempting any exertion. The blood itself loses its vitality and its fibrine is destroyed, its corpuscles lose their power to arrange themselves into rouleaux, and it becomes universally diffluent, even during life, and local and universal hæmorrhages and extravasations occur. After death, in subacute and chronic cases, the heart and large blood-vessels are found congested, softened, spotted with extravasations, and occupied by dark fluid blood; it would appear as if the heart had not had power to empty itself, as though it had been arrested in diastole. The pericardium, too, is found either to show results of inflammation, or to be dotted with ecchymoses, and its cavity occupied by blood sometimes clotted but mostly fluid, sometimes bloody mucus, perhaps frothy. The blood itself throughout the body is universally diffluent, of a dark colour and perfectly fluid, so as to be able to be poured from vessel to vessel like water; its corpuscles are sometimes crenated; in one instance it contained large oil-globules, in another it broke up into crystalline masses resembling hæmatin; and it decomposes with extreme rapidity. The sensation as if the heart tumbled over is an almost unfailing indication for the exhibition of Crotalus, if the other symptoms correspond. v. Ss. 419—440.

v. § 10, p. 155.

Therapeutic Application.

In accordance with this general and profound disturbing and disorganising action of Crotalus on the heart, blood-vessels, and blood, its therapeutic sphere and usefulness in diseases of the circulatory system are extensive and important. It is especially useful in ailments that have in any way resulted from septic or zymotic influence or infection, or that are in any way connected with the state ordinarily known as blood-poisoning, whether primary or secondary, especially the latter, and particularly if of a hæmorrhagic character, and all the more so if there be evidence of disorganised blood, or softened vascular structure; also in disturbances of the circulation dependent upon morbid states of the origin of the pneumogastric nerve.

The diseased states worthy of special notice here are:

Passive and Venous Congestions in low states of vitality and broken-down constitutions, where there is a tendency to general or local venous relaxation or torpidity, such as liability to chilblains, frostbite, &c.

Varicosis, *Varicose Veins*, *Varicocele*, *Venous Torpidity*, especially resulting from alcohol, and under the conditions named under venous congestions.

Hæmophilia, *Hæmorrhagic Diathesis*, especially where there is evidence of softening in the vascular walls or disorganisation of the blood; where the blood is indisposed to coagulate, even though arterial, or is dark in colour; passive hæmorrhages, where the blood appears to ooze

or leak through the vascular walls and escape into the surrounding tissues, or over or from free surfaces, mucous membranes, &c., as if the blood were dissolved or as if the vessels had no power to retain within them the circulating fluid, as if the whole system were in a state of dissolution. In such a case, for instance, as that recorded in the *Lancet* for May 26th, 1883, vol. i, p. 903.

Purpura, especially hæmorrhagica; and Extravasations, Vibices, Maculæ, Petechiæ, &c., such as occur on the lower extremities in low and debilitated states of the system, and in broken down constitutions, such as exists in chronic inebriates.

Phlebitis; in low, debilitated, erysipelatous states of the system; and especially from absorption of septic matters, as uterine phlebitis, suppurative phlebitis, diffuse phlebitis, inflamed varicose veins, &c.

Lymphangitis, Angioleucitis; from septic absorption, pyæmia, dissection wounds, bites of venomous insects, &c., in broken down constitutions.

Peliosis rheumatica; especially if, as in the three cases given by Dr. McCall Anderson in the *British Medical Journal*, June 9th, 1883, p. 1103, it be marked by œdema, large purpuric spots and bullæ in which "the black purpuric patches, covered with a flaccid envelope of the bullæ after the serum had escaped, were like patches of skin which had mortified."

Pernicious Anæmia, Leucocythæmia (Leukæmia); in constitutions broken down by gonorrhœa, syphilis, alcohol, &c.; and especially if of splenic origin and marked by accumulations of incoagulable blood, and a tendency to hæmorrhages into the gums, mucous membranes and skin; and where, as proved by a *post-mortem* section of such a case, "the blood is fluid and incoagulable, with serum effused into the pericardium and other cavities; the lungs œdematous; the mucous membrane of the small intestine thickened; liver enlarged and fatty; kidneys slightly granular; and hæmorrhages into the retina;" v. *British Medical Journal*, June 9th, 1883, p. 1112, and *Lancet*, February 3rd, 1883.

Palpitation.—The softening influence Crotalus exerts upon the structures of the heart gives it a place in the treatment of the palpitation of debility, obesity, and fatty heart; and its disorganising influence on the blood and the origin of the pneumogastric nerve gives it a place in the treatment of "nervous" palpitation, angina pectoris, and in the imitation of the latter occurring in hysterical women.

Pulse, morbid.—The morbid state of the pulse in which Crotalus will be found useful are, principally, the feeble, fluttering, frequent, small, quick, thread-like, weak, scarcely perceptible, trembling, wavy, or slow pulse; especially when met with in connection with the before-mentioned states of the heart, blood-vessels and blood, or in septic or zymotic disease.

Exophthalmic Goitre; especially when traceable to any exhausting or toxæmic cause, such as over lactation, excessive or suppressed menstruation, &c.

Clinical Experience.

Clinical experience with Crotalus in diseased states of the circulatory organs is yet only limited. It has been known to cure palpitation of the heart and pain at the heart, v. *Jahr's New Manual*, i, 617 ; and the present writer has frequently relieved palpitation of the heart with *Crotalus* 6, especially when accompanied by a feeling as if the heart tumbled over, and when there is much feeling of trembling of the heart. For a case of cure of irregular action of the heart and universal petechiæ v. Mr. B. "Skin" 'clinical;' and for a case of cure of ecchymosis of lower extremities v. Mr. L., "Lower Extremities" 'clinical.' DR. MITCHELL records the case of a dog: "his pulse, which was naturally about 145 and irregular, was at the fifth minute 140 and regular." v. Ca 6, l. 5, p. 239.

Dr. Bayes says: "Palpitation of the heart, with wheezing and anxious respiration, is well met by lachesis, especially where the cough is asthmatic, and there is a tendency to vomit." *Applied Homœopathy*, p. 109.

The appropriateness of Crotalus in diseases of the circulatory organs and of the blood is corroborated by the large amount of successful experience with the more familiar and very similarly-acting serpent venom, lachesis, v. *Jahr's New Manual*, ii, 48; and DR. RUTHERFORD RUSSELL, writing on the power of the serpent venoms in heart diseases, says: "Of lachesis I need scarcely speak, its action in these cases is so universally acknowledged." *Brit. Journ. Hom.*, xii, 372. In the hands of DR. C. DUNHAM it has rapidly cured secondary phlebitis. *Mat. Med.*, ii, 250. And DR. P. P. WELLS says of it: "This is one of the most important remedies in rheumatism of the heart, and in cases of deposited fibrin into the cavity and upon the surface of the pericardium, or upon the surface of the valves, and is one of our chief reliances for its removal." *Amer. Hom. Rev.*, 1863, p. 300. The other very similarly-acting serpent venom, naja, is also a very valuable heart remedy. DR. RUTHERFORD RUSSELL gives several cases of palpitation relieved by it. *Brit. Journ. Hom.*, xii, 372. And he says: "In diseases of the heart, such as those described by DR. BRADSHAW, it is an invaluable remedy; especially in simple acute hypertrophy and in old valvular disease, and in very many forms of functional derangement of this organ. I have had several cases, one of a colleague, in which all other remedies had failed to give relief in hypertrophy and its consequences, when naja effected what I may call a cure, at least a suspension for years, of the morbid symptoms." *Annals Brit. Hom. Soc.*, i, 304. And he adds further: "I do not think it possible to exaggerate the utility of naja in the treatment of organic disease of the heart, whether of hypertrophy or valvular affections. This was the chief remedy I employed in the case of the lady whom I described as having been rescued from apparently inevitable death. In her case there was no possibility of deception; the disease was as well marked as any disease could be, and the improvement beyond doubt or denial. Nor is this the only case. I am at present treating a very bad one of valvular disease of fifteen years' standing, and once or twice the limbs have swelled to double their natural size and been reduced by giving naja." *Brit. Journ. Hom.*, xii, 549. And Dr. BRADSHAW relates a case of angina pectoris, and one of organic disease of the heart, in which naja was of immense service. *Annals of Brit. Hom. Soc.*, i, 296, 7.

§ 16. Symptoms of Nape and Back (441—451).

v. § 9, p. 154.

441. Bruised pain in paroxysms behind in shoulder-blades, especially on moving the arms backwards; second day.—SCHMÖLE, C. H. 2096, **A** 1, p. 195.

442. Eruption of numerous distinct red spots (petechiæ), very small, with a few larger ones between shoulder blades.—LINGEN, C. H. 3458, **A** 1, p. 195.

443. Fulness down the side as low as the loins; with extravasation of blood underneath skin, giving to the back on right side a mottled appearance. The whole hand and arm were cold, but painful when pressed, and the skin was very tense. On inside of arm, below axilla and near elbow, vesications had formed, and under each of the vesicles was a red spot in the cutis the size of a crown piece. There was a tremulous motion of his lips; and the faintings recurred at nearly the same intervals as on the preceding evening (every 15 minutes). *Seventeen hours after bite on thumb and finger.*—SOPER, **C** 33, l. 23, p. 234, v. *P.M.*, l. 125, *et seq.*

444. The whole side up to arm greatly swollen, and black from effused blood. *Thirty-six hours after bite on leg.*—BOY, **C** 9, l. 2, p. 216.

445. During third night after bite on finger back became very sore, painful, and swollen down to hips.—WDH., **C** 23, l. 17, p. 222.

446. Pain in kidneys. *Thirty hours after inoculation.*—MANZ., **B**3*a*, l. 21.

447. "The cord was evidently all but paralysed. Muscular fibres contract freely to direct electric stimulus. . . . The electrodes applied to sciatic nerve showed that the nerve, as well as the spinal cord, was paralysed." *After injection of diluted dried venom into peritoneum.*—GUINEA-PIG, *P.M.*, **B** 10, l. 22, p. 208.

448. "Electrodes in cord do not cause contraction of limbs, but sciatic nerve, when irritated, conveys impressions, muscles of legs contract. Death appeared to be caused through the medulla." *Five minutes after death from injection into jugular of gr. ¼ dissolved dried venom.*—CAT, **B** 15, l. 25, *P.M.*, p. 210.

449. "Death caused by rapid paralysis of medulla and cord." *After injection of gr. ¼ dissolved dried venom into jugular vein.*—RABBIT, *P.M.*, **B** 14, l. 12, *P.M.*, p. 210.

450. Spinal cord and its membranes congested. *P.M.*—DRAKE, **C** 28, l. 100, p. 228.

451. The brain was highly congested, and there was a good deal of bloody serum in its cavities. Similar congestion existed in the spinal canal, and at several points the white nervous tissue was stained with small patches of blood. *P.M.*—RABBIT, **Ca** 26, l. 15, p. 246.

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Congestion of cord and its membranes (p.m.), 450, 451.
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Petechiæ, scapula, 442.
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Swelling, whole back, 445; side, 443, 444.

Pathogenetic Commentary.

As well as the pain, soreness, swelling, petechiæ, mottling, ecchymosis and extravasation distinctly referred to as having been produced in the back, to this region may be referred also the spinal conditions which give rise to the feeling of sensibility of the whole surface of the body, universal numbness, tremulous weakness, general trembling, universal twitchings, loss of co-ordination of movement, staggering, spasms on attempting to walk, tetanic convulsions, chorea, paraplegia, &c. After death in subacute and chronic cases the spinal cord and its membranes have been found congested, and the cord itself absolutely paralysed. v. Ss. 447—451, also 124—132.

v. § 10, p. 155.

Therapeutic Application.

The affections of the Nape, Back, and Spine in which Crotalus is indicated, are especially: carbuncles, boils, pustules, pimples, bedsores, spinal congestion, spinal irritation, spinal meningitis, myelitis, spinal paralysis, glosso-pharyngeal paralysis; multiple sclerosis, lateral sclerosis, locomotor ataxy, progressive muscular atrophy, softening, tetanus, paraplegia, general paralysis, post-diphtherial paralysis, general paralysis of the insane, &c.; especially when occurring in connection with some morbid state of the blood, as after menstrual suppression, at the menopause, or during syphilis, or during or after some septic or zymotic disease.

Clinical Experience.

There has not yet been recorded much clinical experience with Crotalus in diseases of the back and spine. DR. WALLACE says: "The nervous and muscular systems are speedily roused into action by Crotalus. *Palsy* is much benefited, old rheumatisms are removed or relieved."—A 11, p. 200. DR. BRADSHAW quotes DR. ELB, of Dresden, as saying: "The result of my experience is that Crotalus is a useful medicine in *Softening* of the spinal cord, and this in cases

where there is little or no tenderness on pressure. . . . Crotalus is not so well suited for spinal irritation as for softening of the cord; and although I will not venture to affirm that I have cured softening of the spinal cord by Crotalus, yet I have certainly seen it arrested by this remedy, in one case for two years."—*Annals of Brit. Hom. Society*, i, 303.

Tetanus. In a case of tetanus from a wound in the foot the symptoms were most severe. Chloral, bromide of potassium, and chloroform had been freely used without apparent benefit. Dr. Ameden then, from physiological deductions, determined to try the venom of the rattlesnake. This was injected subcutaneously on two occasions, the tetanic symptoms and rigidity ceased, and were replaced by extreme prostration, followed, however, by a fairly rapid recovery.—*Med. Times and Gaz.*, November 24th, 1883, abstracted from *Philadelphia Medical News*.

With the more familiar and very similarly-acting serpent-venom, lachesis, there is, however, much clinical experience in spinal affections. v. *Jahr's New Manual*, ii, 48, 58. DR. C. WESSELHOEFT records the case of a child, aged 5, with *Spinal Disease*, very much benefited by lah. 30. *Brit. Journ. Hom*, xxii, 482. And of another very similarly-acting serpent-venom, DR. BRADSHAW quotes DR. ELB, of Dresden, as saying: "The following indications for the use of *naja* have been derived from clinical experience; general symptoms that involve the whole body, without there being a marked preponderance of any kind of pain, on the one hand, or of anæmia, on the other; only the spine may be a permanent seat of uneasiness, amounting to distress, and inducing a great amount of debility; and if this does not reach the height of positive paralysis, yet there is a painful lameness of the extremities, with extreme sensibility on pressure of the spinal column." *Annals of Brit. Hom. Soc.*, i, 301. DR. RUTHERFORD RUSSELL says: "In many affections of the spine, both where there is *Inflammation* of the spinal cord and some forms of consequent paralysis of some of the muscles, and also where there is that state of *Hyperæsthesia* known as *Spinal Irritation*, I have seen some striking instances of cure in this malady by naja." *Annals of Brit. Hom. Soc.*, i, 304. And the other very similarly-acting serpent-venom, elaps, has cured hemiplegia. *Brit. Journ. Hom.*, xxxiv, 467.

§ 17. Symptoms of the Extremities in General (452—467).

v. § 9, p. 154.

452. Heaviness in arms and legs, as if the bones were made of heavy wood.—SCHMÖLE, C. H. 2452, **A** 1, p. 195.

453. In the evening on sitting a painful paralysed sensation in the bones of the fingers, arms, and legs.—SCHMÖLE, C. H. 2460, **A** 1, p. 195.

454. Drawing in the bones of right arm as far as the thumb and little finger, at the same time pain in left foot.—SCHMÖLE, C. H. 2120, **A** 1, p. 195.

455. In the toes and fronts of the fingers numb pains, like after cramp, several times, second day.—SCHMÖLE, C. H. 2399, **A** 1, p. 195.

456. Pain in the muscles and joints. *Thirty-eight hours after inoculation.* —MANZ., **B** 3 *a*, l. 22, p. 205.

457. Pains in all the limbs, with coldness and weakness in them, also

paralysis of (right) upper eyelid (l. 53). On the third day he had to use a stick in walking (l. 69) and still complained of slight pain or twitching in the wounded limb, and did not plant heel firmly on the ground. *After a bite on right heel.*—FRANCESCO, C 6, l. 73, p. 215.

458. Pain in bitten limb, relieved immediately by topical use of Liq. Amm. *A few minutes after bite.*—BOY, C 4, l. 4, p. 213.

459. In addition to above symptoms [ll. 23—34] there was starting of the limbs. *Twenty-one hours after bite on thumb and finger.*—SOPER, C 33, l. 35, p. 234.

460. Along with delirium, drowsiness, and twitching, deafness and blindness, thirst, vomiting, and diarrhœa, "there was paralysis of both upper extremities, particularly below the elbows, and, to a less degree, of the lower limbs also. The child made repeated ineffectual attempts to stand up, but as soon as he got on his hands and knees, or into the kneeling position, he fell back helplessly on his side." There was also paralysis of the upper eyelids. After reaction had been brought about with stimulants there was some headache, and after this two convulsions, and then great pain in the chest and failure of pulse. *Four hours after bite on hand.*—JEF., C 30 *a*, l. 44, p. 232.

461. Extremities cold and insensible, body perfectly motionless and covered with a cold viscous sweat. *Ten minutes after bite on cheek.*—CHILD, ll. 5, 9, C 27, ll. 5, 9, p. 226.

462. Cold extremities. *Forty-two hours after bite on thumb and finger.*—SOPER, C 33, l. 50, p. 235.

463. Cold extremities. *Eighteen hours after bite on arm.*—LAKE, C 26, l. 12, p. 225.

464. Weakness increased, and he staggered in his gait. *Three hours after bite on thigh.*—DOG, Ca 4, l. 7, p. 238.

465. Resting on fore paws, stretched out, swinging, lying on side, then lying on back for four hours. Death without convulsions. *Two to four hours after bite.*—DOG, Ca 11, l. 7, p. 242, C. H. 130.

466. Hopping on all fours, as if limbs had become rigid. *Immediately after bite on back of neck which did not reach spine.*—GUINEA-PIG, Ca 24, l. 4, p. 244.

467. Bitten on neck. It immediately uttered a cry, and there was a little quivering on the flank. Occasional convulsive movement of limbs. Died within two hours.—FROG, Ca 35, p. 247.

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Coldness, 56, 462, 463, 563; and insensibility, 461; and weakness, 457; and loss of power, 67.
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Paralysed sensation, painful, 531.
Paralysis, 460.
Power, loss of, 55.
Rigidity, 465, 466.
Sensation as if paralysed, 531.
Startings, 459.
Swelling, recurrent, 574.
Trembling and convulsions, 64.
Twitching, 457, 467, 512.
Weakness, 464; and coldness, 457.

Pathogenetic Commentary.

From the extremities having been the parts usually bitten, the numerous symptoms recorded as having occurred in them must be looked upon as being more of the character of topical effects than as evidences of any real idiopathic affinity of Crotalus for the extremities, as such. Nevertheless, many of the symptoms are truly idiopathic and contingent; such as, the coldness, numbness, twitching, trembling, starting, and the paralysed sensation; as well as some of the neuralgic pains.

v. § 10, p. 155.

Therapeutic Application.

The affections of the extremities in which Crotalus is likely to be found useful are:

Compound Fractures; especially when occurring in the course of zymotic or septic disease, in broken-down constitutions, old inebriates, or other states of low vitality or degraded blood; also where there is a tendency to gangrene, or unhealthy suppuration, or with threatening septic absorption.

Cramps, Startings, Jerkings, Trembling, Unsteadiness, &c.; especially under the conditions noticed under Fractures.

Rheumatic and Neuralgic Pains; especially under the above-named conditions.

Gonorrhœal Rheumatism; especially in chronic syphilitics and inebriates.

Clinical Experience.

There has not yet been much clinical experience with Crotalus in the treatment of morbid states of the extremities in general; but in a case of *Gonorrhœal Rheumatism* in a chronic inebriate the present writer witnessed much improvement follow a course of *Crotalus* 6; and he has frequently known neuralgic pains disappear when the patient was under *Crotalus*.

With the more familiar and very similarly-acting serpent venom, lachesis, there has been very considerable experience in the treatment of affections of the extremities. v. *Jahr's New Manual*, ii, 57. DR. RICHARD HUGHES writes: "Malignant local inflammations, with secondary blood infection and nervous prostration, have proved pre-eminently the sphere of action of lachesis. A typical instance is traumatic gangrene. Of this disease DR. D. M. DAKE has published three cases, which are so decisive as to overcome even DR. HEMPEL'S scepticism as to the virtue of the remedy. They are given at length in the second edition of his *Materia Medica*; and in the fourth volume of the *Amer. Hom. Rev.* DR. SEARLE, of Brooklyn, has recorded two others. To these I would add the testimony of DR. FRANKLIN, who, as army-surgeon in the late civil war in America, had abundant opportunity of seeing the disease. "I have used this remedy," he writes in his *Science and Art of Surgery*, "in a number of cases of gangrene following wounds, and have never been disappointed

in its results. In a case of compound comminuted leg fracture, terminating in gangrene, and threatening speedy destruction of the limb, the gangrene was quickly checked by the internal and external use of lachesis, the inflammation subsiding, and the healing process moving on to a complete cure. In another case of compound dislocation of the ankle-joint, with fracture of malleolus externus, followed by gangrene, lachesis effected a speedy cure, the patient making a good recovery under the surgical treatment employed. I cannot recommend too highly the use of this agent for gangrene, and am confident that the observations of all who have employed or may employ it will bear me out in the assertion that it is eminently curative of gangrenous affections.

"It is affections of this kind, moreover, which form the bulk of the paper of DR. CARROL DUNHAM to which I have referred. He begins with a case of septicæmia occurring in his own person, as the result of a wound incurred during the post-mortem examination of a case of puerperal peritonitis. Both the local and general symptoms were severe, but they rapidly yielded to lachesis 12, three times a day. Next he relates an epidemic of malignant pustule, in which he treated eight cases with lachesis alone. 'It relieved the pain within a few hours after the first dose was given, and the patients all recovered very speedily.' Then he speaks of three cases of phlebitis supervening upon ulcers (probably syphilitic) of the lower extremities. There was a great and sudden prostration of strength, low muttering delirium, and general typhoid symptoms, indicating pyæmic infection. The effect of lachesis was all that could be desired, the patients rallying promptly, and all symptoms of phlebitis speedily disappearing. Last, he narrates one case, and refers to others, of carbuncle, in which the constitutional symptoms denoted very great prostration, *not* preceded or attended by the nervous and vascular erethism which is sometimes observed in similar cases. The absence of this condition is, he thinks, in all these disorders the indication for lachesis as against arsenicum, when the asthenia is not so complete as to call for carbo-vegetabilis." *Pharmacod.*, p. 605.

§ 18. Symptoms of the Upper Extremities (468—514).

v. § 9, p. 154.

468. Bruised, cramp-like pain in upper part of both arms.—SCHMÖLE, C. H. 2122, A 1, p. 195.

469. Trembling in the hands when at rest.—LINGEN, C. H. 2217, A 1, p. 195.

470. Occasional dull pains in the bones of fingers, especially right index finger.—SCHMÖLE, C. H. 2163, A 1, p. 195.

471. Itching at the middle joints of all the fingers of both hands.—LINGEN, C. H. 2229, A 1, p. 195.

472. In the first phalanges of right little finger and left middle finger a violent pain as if in winter time a very cold hand were suddenly brought close to the fire; the same pain later on in left ring finger.—SCHMÖLE, C. H. 2177, A 1, p. 195.

473. Drawing in the bones of right arm as far as the thumb and little finger, at the same time pain in left foot.—SCHMÖLE, C. H. 2120, A 1, p. 195.

474. Violent pain in right arm, immediately above elbow.—SCHMÖLE, C. H. 2135, A 1, p. 195.

475. Pain in right elbow and at same time throbbing bruised pain under right arm and on ribs, worse by touch and by moving arm to and fro.—SCHMÖLE, C. H. 2134, A 1, p. 195.

476. Waked up about 5 a.m. of third day with severe drawing pain in

right wrist, not relieved by rubbing, lasting ten minutes.—*After twelfth dose, twenty drops, third dil.*—HAYNARD, **A** 3, l. 48, p. 197.

477. Dull tired sensation in right hand and fingers.—SCHMÖLE, C. H. 2164, **A** 1, p. 195.

478. Dull pain in last phalangeal joints of right hand.—SCHMÖLE, C. H. 2165, **A** 1, p, 195.

479. Violent pain in palm of left hand like the sting of a bee but more cramp-like, much worse on moving little finger which pains in its first joint.—SCHMÖLE, C. H. 2184, **A** 1, p. 195.

480. Violent, dull, drawing pains in the bones of the thumb of left hand.—SCHMÖLE, C. H. 2178, **A** 1, p. 195.

481. In left ring finger six times a shooting pain, with rapid pulsation, each time lasting only a few seconds; fourth day.—SCHMÖLE, C. H. 2193, **A** 1, p. 195.

482. In both first phalanges of left little finger a bruised pain, with pulsation in the finger end.—SCHMÖLE, C. H. 2166, **A** 1, p. 195.

483. Arm, from shoulder and front of thorax to fingers, swollen to twice its natural size, and very painful on movement. *Eighteen hours after bite on arm.*—LAKE, **C** 26, l. 9, 25, p. 225.

484. The hand, wrist, forearm and arm were much swollen up to the top of the shoulder and into the axilla. The arm was quite cold; and no pulse could be felt in any part, not even in the axilla, partly in consequence of the swelling. The skin generally was unusually cold [remaining so for eight hours, v. l. 26]. The mind was quite collected. *Nine hours after bite on thumb and finger.*—SOPER, **C** 33, ll. 7, 118, pp. 234, 6.

485. Arm, shoulder, and upper portion of side greatly swollen and thickly covered with small blisters filled with fluid of a yellowish colour. *About thirty-six hours after bite on finger.*—BURNE, **C** 15, l. 12, p. 218.

486. The tumefaction had extended to the shoulder; with blue-black streaks up to the axilla. *Sixteen hours after bite on finger.*—STEEL, **C** 22, ll. 12, 24, pp. 221, 2.

487. After a bite on finger, a well-marked line of inflammation extended along arm to axilla. *After twenty-four hours.*—WDH., **C** 23, l. 10, p. 222.

488. Within half an hour after a bite on finger the glands in axilla were becoming sore and painful.—WDH., **C** 23, l. 5, p. 222.

489. Severe pain and great swelling of hand, forearm, and arm, nearly to shoulder, with discolouration of the integument; followed by marked contraction of some of the flexors of the hand, and also nausea. *Shortly after bite on thumb.*—MARY O., **C** 25, l. 13, p. 223.

490. Within an hour and a half the swelling had extended to the elbow; and within two hours it had reached half way up the arm; and the pain had extended to the axilla; the skin was cold; pulse 100; his answers were incoherent, and he complained of sickness. *Bite on thumb and finger.*—SOPER, **C** 33, l. 5, p. 234.

491. The arms were powerless. *Two hours and a half after bite on hand.* MACH., **C** 29, l. 36, p. 229.

492. Intense pain extending over whole arm and much swelling of

hand. *Two hours after bite on hand.*—MACH., C 29, ll. 16, 18, 35, p. 229.

493. The whole hand and arm were cold, but painful when pressed, and the skin was very tense. On the inside of the arm, below the axilla and near the elbow, vesications had formed, and under each vesicle was a red spot in the cutis, the size of a crown pieee. *Seventeen hours after bite on thumb and finger.*—SOPER, C 33, ll. 26, 124, pp. 234, 6.

494. The hand and arm became very painful and much swollen the first day; and on the second day the fingers became semiflexed on the palm and rigid; the hand flexed on the forearm, and the forearm on the arm; and all were of a livid colour, black and blue, and cold. *After a bite.*—SHIPMAN, C 8, l. 27, p. 216.

495. The skin of whole arm had a livid appearance, similar to what is met with in a dead body when putrefaction has begun. An obscure fluctuation was felt under skin on outside of wrist and forearm, inducing the surgeon to make a puncture, but only a small quantity of serous fluid was discharged. *Twenty-one hours after bite on thumb and finger.*—SOPER, C 33, l. 37, p. 234, v. *P.M.*, l. 120, *et seq.*

496. Arm worked, jumped, writhed, and twisted about like a snake; and changed colour and became spotted; and the arm grew painful in the bone; though a band were tied tightly round it. *About twelve hours after bite on hand.*—BNTL., C 16, l. 18, p. 219.

497. Within half an hour the swelling had extended half way up the forearm, the part had become very painful and the skin very tense. *Bite on thumb and finger.*—SOPER, C 33, l. 4, p. 234.

498. Abscess and sloughing of arm, with rigor and diarrhœa; brown discharge with sloughs of cellular membrane. *Twelve days after bite on thumb and finger.*—SOPER, C 33, ll. 85, 88, p. 235, v. *P.M.*, l. 120, *et seq.*

499. Arm quite cold; and skin of whole body unusually cold. *Nine hours after bite on thumb and finger.*—SOPER, C 33, l. 17, p. 234.

500. Reappearance of swelling on discoloured arm; which then suppurated and burst. *Eight months after bite on hand.*—BNTL., C 16, l. 31, p. 219.

501. Boils, in all about eighty at one time; on arm that had been swollen. *After a bite on finger.*—BELCHER, C 24, l. 21, p. 223.

502. Hand and arm and glands in axilla much swollen and very painful, relieved by resting arm on inclined plane. *Thirty-six hours after bite on finger.*—WDH., C. 23, ll. 12, 15, p. 222.

503. Though right-handed, whenever he attempted to drink or take anything, it was with (the left) the wounded hand; and he complained that he could not use the right arm with freedom. *Three hours and a half after two bites on hand.*—DRAKE, C 28, l. 36, p. 227.

504. The hand grew cold and numb, and suddenly puffed up. *About ten hours after bite.*—BNTL., C 16, l. 12, p. 219.

505. Five minutes after a bite on hand a slight sensation of coldness was felt in the hand.—MACH., C 29, l. 15, p. 229.

506. The hand began to swell immediately. *Bite on thumb and finger.*—SOPER, C 33, l. 4, p. 234.

507. Immediate swelling of hand. *After bite.*—MACH., C 29, l. 13, p. 229.

508. Hand filled with serum. *Forty-eight hours after bite on finger.*—WDH., C 23, l. 27, p. 222.

509. Immediately after a bite on finger the parts became tumid and livid, so that within the first half hour the whole back of hand had become puffy and tumid, with effused blood in the areolar tissue, and the forearm had begun to swell.—STEEL, C 22, l. 8, p. 221.

510. On slitting up back of hand and cupping it he drew off about a quart of ugly, poisonous, slimy stuff. *About ten hours after a bite.*—BNTL., C 16, l. 15, p. 219.

511. Periodically returning contraction of tendons of flexor carpi radialis, returning for some years *regularly every three months*, afterwards for some years at longer and less regular intervals, and finally ceasing to appear. *After bite on proximal phalanx of thumb.*—MAY O., C 25, l. 24, p. 224.

512. Involuntary movements of right thumb and left leg [bitten between articulations of ring and little fingers, probably of right hand]. *Fifteen hours after bite.*—MACH., C 29, l. 88, p. 230.

513. Gangrene of finger, with thin watery discharge, without smell. *Sixth day after bite.*—WDH., C 23, l. 20, p. 222.

514. Soft parts sloughed away and bone exfoliated. *Some weeks after bite on finger.*—WDH., C 23, l. 36, p. 222.

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Pathogenetic Commentary.

Some of the symptoms recorded as having occurred in the upper extremities appear to be really idiopathic and contingent, for instance, itching of the palms with sensation of heat in them, dry, parchment-like condition of the skin of the palms, coldness of the hands, numbness, trembling, paralysed sensation; also inflammation of the axillary glands and red axillary perspiration.

v. § 10, p. 155.

Therapeutic Application.

The affections of the upper extremities in which Crotalus is likely to be found useful are:

Coldness and blueness of the fingers, chilblains, felons, itching and heat of palms, parchment-like condition of skin of hands, psoriasis palmaris, pimples, pustules, boils, suppurating axillary glands, tubercles, petechiæ, numbness, paralysed sensation, trembling, jerking, cramps, neuralgia, &c., especially when occurring in debilitated, broken-down constitutions or depraved blood conditions.

Clinical Experience.

There is not yet much recorded clinical experience with Crotalus in the treatment of affections of the upper extremity. The present writer has seen much benefit result from its use in the treatment of *Chilblains*, especially when threatened with gangrene, and when chronic or occurring in not very cold weather, thus indicating a low nervous and vascular vitality; also in felons, itching and heat of palms, vesicular and pustular *Eruptions* about wrists, &c.; and in *Coldness* and *Blueness* of hands and fingers connected with weak nervous system and heart. The following cases occurred in his practice:

Tubercle on Wrist. Miss K—, aged 22. Whilst feeling this young lady's pulse in March, 1881, I noticed a tubercle on the wrist near the end of the radius; it was the size of a large split pea and was rather blue. She said it had resulted from the sting of an insect whilst she was gathering fruit some years ago, and had existed ever since, being more pronounced during the summer months. I had to prescribe Kali bich. 3 internally for a cough, but I ordered *Crt.* 6 tincture for her to moisten the tubercle with once every day. It disappeared within two weeks and never returned.

Red Spot. Mrs. S—, aged 57. Whilst treating this lady for chronic hæmorrhoids in June, 1871, on feeling her pulse she withdrew her hand to rub a red, itching spot on the back of her left third finger. She said it originally resulted from the bite of some insect brought by

her monthly nurse twenty years ago, and had returned regularly at the same time every year ever since, each time it lasted about a week; and though many things had been tried, nothing had much relieved the burning itching or prevented its return. It had this time been present three days. Having in my case a little tincture of *Crotalus* 3 I dropped a little on it and rubbed it well. The next time I saw the lady she said the spot had soon ceased to itch, and had disappeared within two days, that is, had lasted only five days this time. I have continued to attend this lady for different ailments ever since, and I know as a fact that the spot never again returned. v. C 25, p. 223.

Tingling and Pricking. Mrs. J—, aged 33, married six years, no children, but several miscarriages. Her husband has chronic syphilis, and has lately become impotent, and for the last twelve months she has ozœna. Reports that for two months she has noticed her hands tingling and pricking—"going to sleep"—especially the left one, on the least exertion, and that "they become quite dead" when she sews; the left leg is also similarly affected. She had a similar attack three years ago, for which she was treated with electric and salt-water baths, and gradually recovered within three or four months. *Crt.* 6 three drops three times a day was prescribed. Within a week she began to have less tingling, and it totally disappeared within five weeks, and the ozœna within two months. v. Nose, p. 276.

With the more familiar, very similarly-acting serpent-venom, lachesis, there has been considerable experience in the treatment of affections of the upper extremities. v. *Jahr's New Manual*, ii, 49, 50. DR. C. HERING relates the following case: "A young man, weakened by disease and by medicine, had suffered much from pains in the bones (probably mercurio-syphilitic) of the right arm, which had been still further weakened by the fracture of the clavicle. After he had been cured of this pain, as well as of caries of the upper jaw, and had remained perfectly well during four months of the coldest weather, that is, from December to March, he was attacked, without any ascribed cause, except that he had taken a piece of ice in his hand, suddenly one morning with the following affection: Swelling of the back of the right hand, extending down the fingers; the whole after a few minutes became quite livid. After being wetted with hot brandy it went off; but after some days it returned as suddenly as before, and much more severe, and then it appeared every day, each day earlier than the foregoing, and continued 3 or 4 hours. It begins with severe itching and "creeping" (*kriebeln*), the hand becomes blue and gradually darker, and has the appearance, on the worst part, of a contusion but more transparent; it is at parts (*marmorirt*) mottled; the hand looks as if it were stuffed, it is so hard. The affection now grows from the middle of the back of the hand, over all the fingers, the hand is ice-cold, but seems to him burning hot; it is very sensitive to pressure, and he can bear nothing to lie upon it; burning and pricking in the finger ends; the heat of the stove relieves the pain, but increases the creeping sensation. Throbbing pain at the outside of the wrist the whole day; sharp pain extending up the arm as far as the elbow; spasmodic (?) pain in elbow-joint when he carries his arm in a sling, not when he allows it to hang; by every attack there is pain at one small spot under the shoulder (affection of a vein?). There is pricking and burning in the hand as it goes slowly away. Lachesis given after an attack made the succeeding one slighter, and there was no more. It was observed at the last attack that the cold finger-ends when rubbed became white, and by repeated stroking of the finger upwards, the blood was forced into the upper veins, thus the colour left the fingers, but it was more difficult to recover the back of the hand." *Brit. Journ. Hom.*, ii, 374. And DR. T. F. ALLEN records the following: "A labourer, forty years old, came to the Central Dispensary, in Eleventh Street, with a most discouraging-looking hand, which he said he had not hurt in any way. Three days before he had been

working among lumber, and thought he must have been poisoned. It commenced swelling very rapidly two days ago, until it is now three times the size of the well hand; very red, and pits on pressure; between the first and second knuckle is an opening as large as a three-cent piece, looking like (precisely) dirty soft soap; I never saw any thing just like it; around this and along the first three knuckles the skin was bluish-black and inflated by gas (one could see little gas bubbles under the skin), the skin under this black cuticle looked rotten. I separated the fingers (first and second) a little, and the skin cracked right open, exposing this dirty soft-soap appearance underneath; it seemed absolutely rotten. He said it burnt horribly all over his hand, deep in, not on the surface, and he felt some pain in the red streaks that ran up beyond his wrist. He had had no chill, his pulse was not rapid but soft, he had constant thirst. I directed him to sprinkle it with corn meal and keep it wrapped in a dry cloth, and gave lachesis 200 every hour. His hand improved day by day from the first dose of lachesis, and in ten days was quite healed up; he had no discharging from it: the open sore and the place I split open granulated and closed very rapidly. Was it spontaneous gangrene? It certainly got well, and I gave lachesis the credit." *Amer. Hom. Rev.*, 1864, 558.

§ 19. Symptoms of the Lower Extremities (515—551).

v. § 9, p. 154.

515. Continuous, dull, painful, tired feeling in the legs.—SCHMÖLE, C. H. 2284, **A** 1, p. 195.

516. The legs go to sleep readily if he lays one over the other for a little.—SCHMÖLE, C. H. 2289, **A** 1, p. 195.

517. In the morning on waking a bruised pain in all the bones, which passed away after rising.—SCHMÖLE, C. H. 2455, **A** 1, p. 195.

518. In the whole right leg downwards a sensation as if only half alive, on extending the muscles of the same, to this he is driven by an involuntary impulse; the upper part of the body trembles until the head shakes, with tension of the muscles of the forehead and back.—SCHMÖLE, C. H. 2291, **A** 1, p. 195.

519. A stretching, drawing pain in the bone from the left hip to the foot, with twitching in the calf.—SCHMÖLE, C. H. 2274, **A** 1, p. 195.

520. Drawing in the left leg from hip to foot once, suddenly on walking, in the evening.—KUMMER, C. H. 2268, **A** 1, p. 195.

521. Violent tired and cramping pain in the thighs towards the abdomen, and passing backwards, as if he had greatly strained himself at skating; it feels as if the flesh was being dragged up, which makes the pain still worse.—SCHMÖLE, C. H. 2181, **A** 1, p. 195.

522. In both thighs a bruised pain, as if days before he had skated too much, worse on walking or by touch, on second day continuing to fifth day.—SCHMÖLE, C. H. 2278, **A** 1, p. 195.

523. Bruised pain in the thighs, worse on touch or walking, the first day.—SCHMÖLE, C. H. 2279, **A** 1, p. 195.

524. On walking out a few dull drawing pains in the knee-cap and the shin-bone of the right leg, so that for a few minutes he could scarcely walk, after four hours; then violent pains in the hand and jawbone.—SCHMÖLE, C. H. 2307, **A** 1, p. 195.

525. Heaviness in the arms and legs, as if the bones were made of heavy wood.—SCHMÖLE, C. H. 2452, **A** 1, p. 195.

526. When walking a few sudden pains in the right knee, like gout, which returned and continued on sitting still, the second day.—SCHMÖLE, C. H. 2300, A 1, p. 195.

527. Gouty drawing through the right knee and down the leg, standing on the right foot makes it worse: after one hour.—SCHMÖLE, C. H. 2335, A 1, p. 195.

528. Dull drawing pain as if through the marrow from left knee to the sole of the foot.—SCHMÖLE, C. H. 2336, A 1, p. 195.

529. Rheumatic drawing in the right popliteal space between the tendons.—LINGEN, C. H. 2305, A 1, p. 195.

530. When and after walking in the street, a sensation in the right leg as if a tendon were being dragged up from the sole of the foot through the leg, and the foot were so being drawn up.—SCHMÖLE, C. H. 2327, A 1, p. 195.

531. In the evening on sitting a painful paralysed sensation in the bones of the fingers, arms, and legs.—SCHMÖLE, C. H. 2460, A 1, p. 195.

531*a*. Bruised pain in left calf, worse when touched, the first day.—SCHMÖLE, C. H. 2280, A 1, p. 195.

532. Bruised feeling in both ankles, very painful on walking.—SCHMÖLE, C. H. 2375, A 1, p. 195.

533. Bruised pain in the tendon behind the left ankle, increased by touch or moving the foot, the first day.—SCHMÖLE, C. H. 2376, A 1, p. 195.

534. Pressing drawing pain in both heels as far as the ankles, feels as if chiefly in the bones.—SCHMÖLE, C. H. 2389, A 1, p. 195.

535. Burning and a blunt pricking in the sole of the right foot, with a feeling of leaden weight in the foot.—SCHMÖLE, C. H. 2391, A 1, p. 195.

536. Heat and unbearable gnawing pain in the whole of left under part of foot, at the same time drawing in the bones of the right arm as far as the thumb and little finger; after half an hour.—SCHMÖLE, C. H. 2390, A 1, p. 195.

537. Pain in the sole in front of the heel as if one had trodden on something sharp with bare feet; the fourth day.—SCHMÖLE, C. H., 2382, A 1, p. 195.

538. In the toes and front of the fingers numb pains, like after a cramp, several times, the second day.—SCHMÖLE, C. H. 2399, A 1, p. 195.

539. Cramp feeling under the left little toe, a sensation as if someone were twisting it round, the first day.—SCHMÖLE, C. H. 2397, A 1, p. 195.

540. After some topical inflammation (v. symp. 556), followed by disturbance of circulation (v. symp. 391), and cerebration (v. symp. 113), and urination (v. symp. 313), there were on the fifth and sixth days rheumatic pains in wrists, elbows, and ankles; and on seventh day tenderness of heart (v. symp. 391); these were followed by much languor and weakness (v. l. 80); and the thighs, especially the left one, were, for the next four weeks, painful as if the deep-seated muscles were tender, especially noticeable when thigh was resting on edge of chair and on walking. There were also tubercles in skin

of calf (v. symp. 557). November 25th, *i.e.* thirty-one days after application, the thighs were so painful as to interfere much with walking and sitting, as though deep-seated muscles were inflamed or suppurating; driving me to frequently rub them with arnica during the next three days. This painfulness was not gone until December 9th. *After rubbing a little venom into scratch on wrist.*—HAYWARD, **B** 1, ll. 85, 89—96, p. 204.

541. Whole leg enormously distended, and threatened with mortification, the skin having a shining appearance with the discolouration, being black on outside and mottled with black and yellow spots on inside. *Twenty-six hour after two bites on foot.*—BIGGS, **C** 2, l. 6, p. 212.

542. Sensation of great heat in legs, and desires the coverlets to be removed. *Thirteen hours after bite on hand.*—MACH., **C** 29, l. 78, p. 230.

543. Violent burning pain in whole leg, and great swelling. *Fifteen minutes after bite on foot.*—WOMAN, **C** 12, l. 5, p. 217.

544. Cramps in legs, with great debility. *Eighteen hours after bite on arm.*—LAKE, **C** 26, l. 13, p. 225.

545. Violent burning pain in leg of bitten side, and great swelling, with burning sensation as far as the thigh. *Immediately after bite on toe.*—WOMAN, **C** 13, l. 7, p. 218.

546. Pain in legs and feet (came on ten hours and a half after bite), in which up to this time there had been a sensation of death-like coldness. Thirst; pulse 108. *Ten hours and a half after bite on hand.*—MACH., **C** 29, l. 69, p. 230.

547. Intense pain in the bitten foot, shooting up inside of legs to knee, on awaking in the morning. *Twelve hours after bite.*—MISS R., **C** 5, l. 24, p. 213.

548. Death-like coldness of feet and legs for ten hours after bite on hand.—MACH., **C** 29, ll. 39, 71, p. 230.

549. Foot and lower portion of leg so much swollen as to rupture the skin from the toe to the ankle. The parts were quite black.—*About sixteen hours after bite on toe.*—MAN, **C** 21, l. 5, p. 221.

550. The foot remained swollen for fourteen years, and a foul ulcer existed: dirty yellow colour of face; great indifference; only half alive.—JEROME, C. H. 3385.

551. Bitten on belly. Slight local quivering of the nearer muscles and some convulsive extensions of hind legs. Pupils dilated after death which happened at end of an hour.—FROG, **Ca** 36, p. 247.

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Pathogenetic Commentary.

As in the upper so in the lower extremities, some of the recorded symptoms appear to be really idiopathic and contingent, for instance, burning and pricking in the soles, coldness of the feet, tired feeling, heaviness and tingling, paralysed sensation in the legs, tenderness in the thighs, tubercles in the skin of calves, and many of the neuralgic pains.

§ 10, p. 155.

Therapeutic Application.

The affections of the lower extremities in which Crotalus is likely to be found useful are: itching of the skin; pimples; pustules; boils; tubercles; petechiæ; hæmorrhagic spots; varicose veins; startings; jerkings; tremblings; cramps; paralysed sensation; some neuralgias; ulcers, especially varicose, hæmorrhagic, gangrenous; chilblains, and gangrene of toes, &c., particularly when occurring in debilitated, broken-down constitutions, or depraved blood conditions.

Clinical Experience.

There has not yet been recorded much clinical experience with Crotalus in the treatment of affections of the lower extremities. But the present writer has seen much benefit result from its use in *Chilblains*, *Varicose Ulcers*, and *Petechiæ* of the lower extremities. The following case occurred in the practice of the present writer: Mr. L., aged 62, a bachelor, of rather irregular habits especially as to alcohol, and living in a very isolated way with an old mother; after having been in a

weak and low condition for some time, noticed small purple spots appearing on his legs; and very soon both legs, from the knees to the ankles, became covered with ecchymoses; there was also some bleeding with his stools, and his general circulation was very languid. *Crt.* 6 was ordered four times a day, and some out-of-doors exercise. All the ecchymoses had disappeared, his stools were free from blood, and he was in a much better state of health within four weeks.

With the more familiar and very similarly-acting serpent venom, lachesis, experience has been considerable, v. *Jahr's New Manual*, ii, 51, 52. DR. CONSTANTINE HERING reports the case of a young man who had pain in second toe of right foot, followed by a livid swelling extending as far as the knee. Lachesis was exhibited, and he was nearly well within four days. He also adds: "Lachesis I have found very useful in many cases of so-called shortening of the tendons, sensation as of threads stretched along the arms, legs, or from the back of the neck to the eyes, and in various other sensations of tension." *Brit. Journ. Hom.*, ii, 376. It has cured abscess of the knee; erysipelas of foot; and ulcers on lower extremities, the colour of surrounding skin bluish and the discharge ichorous. *Amer. Hom. Rev.*, 1863, 560, 561. Also gangrene of leg after mechanical injury. *Amer. Hom. Rev.*, 1864, 557. And the other very similarly-acting venom, tarantula, has cured abscess of the thigh. DR. JOSÉ J. NAVARRO, *Hom. Times*, and Boericke and Tafel's *Bulletin*, August, 1880; and a bony tumour on tibia, v. DR. S. FREEDLEY. B. and T.'s *Bulletin*, March, 1883.

§ 20. Cutaneous and Topical Symptoms (552—621).

v. § 9, p. 154.

552. Much itching of skin all over body, on awaking in morning. *After ninth dose, ten drops, third dil.*—HAYWARD, **A** 3, l. 34, p. 195.

553. Stinging itching, flying to all parts of the body, worst on the shoulder blades.—LINGEN, C. H. 3477, **A** 1, p, 195.

554. Pricking all over body. *First day.*—MARTIN, **A** 9, l. 2, p. 200.

555. Swelling of whole body, and discolouration resembling a rattlesnake, followed by death in a short time. *Immediately after first taking the milk of its own mother who had been bitten four months previously.*—INFANT (same effect on puppy and three lambs), **A** 13, l. 9, p. 201.

556. Immediately blood began to flow and a pricking, smarting pain occurred in the spot and lasted nearly a minute. The part also immediately began to swell like a wheal of urticaria, quite raised and hard, with sharply defined edges; and within five minutes it had reached the size of a florin; and it continued to swell slowly during the next half hour; finally, reaching size of half a crown. After an hour and a half it had smoothed down, and was soft, but no less in circumference. Next morning wrist felt as if there were some painful swelling amongst the deep-seated structures, but skin had its natural appearance; except that the scratches were very red and visible. On the morning of third day the mark was still full size and looked dry and rough, and the scratches were still very red. The spot did not regain its natural appearance until nearly a week had

elapsed. *After rubbing a little venom into a scratch size of a shilling on left wrist.*—HAYWARD, B 1, ll. 5—10, 18, 45, 53, pp. 202, 3.

557. After some topical inflammation (v. symp. 556) followed by disturbance of circulation, cerebration, and urination : and some articular and muscular pains (v. sympt. 540), on awaking on seventh day noticed skin of palms felt and looked dry and stiff like thin parchment, with some feeling of heat in palms. About fourteenth day noticed several small, hard, itching tubercles, each the size of a pea, had appeared *in* the skin of calves of legs, more numerous in left one ; they continued to increase in number for over two weeks, and then to gradually disappear, by scaling and being scratched. During the second and third weeks my singlets were stained reddish-orange under arms, as if by the perspiration from axillæ. *After rubbing in a little venom into scratch on wrist.*—HAYWARD, B 1, ll. 73, 84—94, pp. 203—4.

558. Immediately blood began to flow, and the part to swell and smart ; the blood oozed out in many small points. *After rubbing a little venom into a scratch on wrist.*—E. D., B 2, l. 4, p. 204.

558a. Itching of the skin and cutaneous eruptions of various kinds. *During convalescence after inoculation.*—MANZ., B 3a, ll. 25, 43, pp. 205—6.

558b. Congestion and extravasation ; patches of ecchymosis in the course of the small blood vessels, like the foliage on the branches of a tree. *Shortly after application of diluted venom to mesentery of a cat.* B 7, l. 9, p. 208.

559. Bitten part began to swell almost as quick as thought, and before any application could be made the place had swollen so as to obscure the fang marks. *After bite on hand.*—SLADIA, C 30*b*, l. 3, p. 233.

560. Profuse perspiration, which lasted for three hours, with intense redness of whole body, especially on bitten limb. *Three hours ana three quarters after bite on hand.*—MACH., C 29, l. 42, p. 229.

561. General soreness. *After a bite on heel.*—MR. B., C 3, l. 10, p. 213.

562. Cold skin, except on bitten extremity. *Five hours after bite on finger.*—STEEL, C 22, l. 17, p. 221.

563. The skin of the extremities was cold. The lower extremities seemed insensible to pressure or pinching. *Half an hour after two bites on hand.*—DRAKE, C 28, l. 23, p. 226.

564. The skin of the bitten hand became so extremely dry that he had to continue moist poultices for several days, because when the skin became dry the pain was extreme, and the skin of hand and of part of forearm desquamated several times. *Two and three and four days after bite on palm.*—SHIPMAN, C 8, l. 34, p. 216.

565. A feeling of soreness in flesh of right hip, and on examination there was discovered a jet-black spot, some two inches in diameter, and having an elevation of about a line, with well-defined edges. During the next four days this discolouration extended up to a level with the umbilicus, completely round the body, and down to the extremities. During convalescence it disappeared gradually from above downwards, leaving the toes last. With this strange discolouration came on great prostration and death-like nausea, so great that

syncope would occur on assuming the upright position. *Four days after bite on left ring finger.*—MR. R—, C 16 *b*, l. 9, p. 220.

566. Skin of whole arm and side of body became of deep orange colour. *Half hour after bite on hand.*—MAN, C 19, l. 4, p. 221.

567. Dark brown colour of point where fang entered, for space of three eighths of an inch. *Thirty-six hours after bite on finger.*—WDH., C 23, l. 23, p. 222.

568. Around the fang-punctures was a greenish areola with some puffiness. *Two hours and a half after bite on instep.*—MISS R—, C 5, l. 10, p. 213.

569. Marble-like, green, yellow, and bluish spots on skin, left by swelling. *Some days after bite.*—WOMAN, C 12, l. 8, p. 217.

570. Greenish-yellow colour of swollen part. The discoloration did not extend as far as the (rapidly-extending) swelling, but seemed to follow it at half an hour's interval. *After a bite.*—WAINWRIGHT, C 30, l. 19, p. 231.

571. After ten hours the swelling of leg, side, and loins gradually decreased; marble-like, green, yellow, bluish spots remained, and only departed after the entire disappearance of the swelling. *After bite on toe.*—WOMAN, C 13, l. 17, p. 218.

572. Hand and arm spotted like a snake, and remained so all summer. In the autumn his arm swelled up again, gathered, and burst, and then all discolouration disappeared. *After bite on hand in February.*—BNTL., C 16, l. 30, p. 219.

573. Yellow and dark spots on the skin, which disappeared in the winter but recurred at the same time of the year following, accompanied by swelling of hands and feet, and followed by death. *After a bite.*—CHILD, C 32 (C. H. 3312), p. 234.

574. Annually at the same time of the year pain, swelling, and fever, with blue and yellow spots on body. *After a bite.*—SCHŒPF, C 20, (C. H. 3313), p. 221.

575. Back of hand blackish and very swollen, and skin of forearm hot and tense. *Five hours after bite on finger.*—STEEL, C 20, l. 20, p. 221.

576. "The immediate vicinity of the bite was not swollen, gangrene having been immediately produced, but the hand and the forearm for four inches above the wrist were very œdematous and of a livid colour and shining; the swelling of the hand was so great that the fingers were semiflexed and separated. . . . At the fourth hour the swelling was found to have reached the bandage above the elbow, and seemed to be arrested there, though well marked livid lines followed the course of the superficial vessels higher up, pointing to the probable disintegration of these vessels and extravasation of blood. The skin of the extremities was dry and cool, but not cold. . . . At 8 o'clock in the evening (eleventh hour after bite) the arm was found more swollen, and blisters had formed on various points; the skin had burst in the bend of the elbow, and a small quantity of extravasated blood was visible." There were great restlessness, thirst, vomiting, and watery purging, also twitchings and paralysis of the extremities. *Within three hours after a bite on hand.*—JEF., C 30 *a*, ll. 11, 36, 41, 57, pp. 232, 3.

577. Along with severe constitutional effects, the whole arm and hand were cold, but painful when pressed, and the skin was very tense. On the inside of the arm, below the axilla and near the bend of the elbow, vesications had formed, and under each of the vesicles there was a red spot in the cutis of the size of a crown-piece, and the whole arm became swollen, œdematous, and of a livid appearance; the blisters afterwards increased greatly in size. *Seventeen hours after bite on hand.*—SOPER, C 33, l. 26, p. 234.

578. The bitten limb much swollen (hand, forearm, arm and shoulder) and a dark ecchymosed line runs from root of finger almost to shoulder-joint. Inside of bitten finger covered with blisters filled with dark fluid blood as far as second joint. Next day inside of arm and belly of biceps became black. *After bite on finger.*—GIRL, C 1, l. 3, p. 212.

579. The whole side up to arm was greatly swollen, and all the side had become black with the effused blood. There was constant retching with very little ejected, and he appeared to be fast sinking with exhaustion. *Thirty-six hours after bite on leg.*—BOY, C 9, l. 2, p. 216.

580. The parts were quite black. *About sixteen hours after bite on toe.*—MAN, C 21, l. 6, p. 221.

581. Mortification of skin near axilla. *Fourteen days after bite on thumb and finger.*—SOPER, C 33, l. 105, p. 236, v. *P.M.*, l. 126, *et seq.*

582. Profuse and prolonged bleeding from the scarifications made in the neighbourhood of the bite. *Eighteen hours after bite on arm.*—LAKE, C 26, l. 8, p. 225, v. *P.M.*, l. 27.

583. Bitten limb (leg) as high up as the hip was enormously distended, and threatened with mortification—the skin having a shiny appearance with the discolouration, being black on outside and mottled on inside with dark and yellow spots; so that one might have fancied it resembled the skin of the snake. The bitten part was very painful, and the inguinal glands on that side were much enlarged. The pulse was low and about 60, and the surface of the body was cold. She felt extreme nausea, and vomited on making least exertion. Great thirst was an attendant symptom from the first, and she had drunk large quantities of water. *When first seen twenty-six hours after bite on toe.*—BIGGS, C 2, p. 212.

584. A broad red line filled with yellow serum followed the course of the lymphatics. *Thirty-six hours after bite on finger.*—WDH., C 23, l. 22, p. 222.

585. A blister formed on bitten finger filled with watery sanguineous fluid without smell, and nail had become loose. *Thirty-six hours after bite.*—WDH., C 23, l. 19, p. 222.

586. A small blister formed at the spot where fangs entered within the first few hours, with intensely burning pain. The pain was increased to intensity by dry heat, driving him wild, but was relieved by a moist poultice. The blister gradually enlarged, so that next day it was as large as a good-sized pear, and on being opened the water that escaped scalded like boiling water. *After bite on palm.*—SHIPMAN, C 8, ll. 10, 24, 32, p. 216.

587. Three months after a bite on proximal phalanx of thumb there appeared on the integument covering the metacarpal bone an eruption of three or four small vesicles about size of No. 1 buckshot, filled with a slightly yellowish fluid, and situated on a somewhat reddened but not raised base, accompanied by contraction of tendons of the flexor carpi radialis, somewhat drawing the hand up and preventing extension. For some years this attack recurred *regularly every three months*, then for some years at longer and less regular intervals, and finally ceased altogether. The eruption of the vesicles was each time accompanied by pain like that of the original bite; they remained out a few days and then dried up, leaving only small reddish spots to mark their site, they were always accompanied by the tendon contraction.—MARY O—, **C** 25, l. 16, *et seq.*, p. 223.

588. Periodically returning vesicular eruption at seat of bite, returning for some years regularly *every three months*, afterwards at longer and less regular intervals for some years, and finally ceasing to appear. *After bite on thumb.*—MARY O—, **C** 25, l. 24, p. 224.

589. The granulations after a slough were rough, and many of them appeared as if they had been sprinkled with yellow ochre. *Sixth day after a bite.*—WDH., **C** 23, l. 34, p. 222.

590. At first blindness and universal pain, afterwards—a few weeks after the bite—all his hair fell off. *After a bite on heel.*—MR. B—, **C** 3, ll. 4, 10, p. 212.

591. "If the poison injected be not in large quantity, or it be properly treated, the symptoms subside, but the part remains for a long time indurated. It has even been supposed that the extraordinary enlargement known under the name Elephantiasis is in many cases a remote effect of this wound."—DAVID BRAINARD, M.D., in *Ninth Annual Report* (1854), *Smithsonian Institution.*

592. Whined at intervals for some hours and suffered much pain. *After bite on shoulder.*—DOG, **Ca** 2, l. 2, p. 237.

593. Suffered terribly, and during two hours whined and yelled incessantly. Enormous swelling occurred involving whole thigh up to pelvic joint. *After bite on thigh.*—DOG, **Ca** 4, l. 1, p. 238.

594. The muscles about the wound twitched a good deal at first, and the general fremitus was well marked within thirty minutes. *After two bites.*—DOG, **Ca** 10, l. 7, p. 242.

595. Swelling and local trembling. He whined at intervals for some hours and suffered much pain. *Immediately after bite on shoulder.*—DOG, **Ca** 2, l. 2, p. 237.

596. The fremitus, at first localised in some of the bites, soon became general, until it disappeared before the profound debility which seemed to affect the entire economy. Death in three hours. *After bites in several places.*—DOG, **Ca** 8, p. 241.

597. Great local pain and swelling, slight local trembling. *Immediately after bite on shoulder.*—DOG, **Ca** 3, p. 238.

598. A growing circle of flattened swelling, of which the dark colour was easily seen through the skin. *After bite on inside of thigh.*—DOG, **Ca** 9, l. 4, p. 241.

599. The wound formed a prominent, almost pendulous, mass several

inches long and broad. *After bite on flank.*—Dog, **Ca** 10, l. 3, p. 242.

600. Though not swollen, the parts around the wound were slightly hardened for about two inches, and on pressure a little bloody serum might be forced out. This continued for three days, when pus also flowed out. *Twenty-four hours after bite on shoulder.*—Dog, **Ca** 1, l. 8, p. 237.

601. The wound discharged blood, then bloody pus, and finally pure pus, up to his recovery at end of three weeks. *After bite on thigh.*—Dog, **Ca** 4, l. 14, p. 238.

602. All the hair of his body fell off. *A month after bite on foreleg.*—Dog, **Ca** 12, l. 7, p. 243.

603. Singular and incessant movement in skin muscles. *After bite on paw.*—Rabbit, **Ca** 32, l. 3, p. 247.

604. Within five days the skin gave way, and the parts beneath sloughed to the bones. *After bite on breast in which nearly all the venom was lost.*—Pigeon, **Ca**, 18, l. 5, p. 244.

605. The muscles about the part immediately began to quiver, and this motion soon extended to both flanks. *After bite on back.*—Frog, **Ca** 41, p. 248.

606. The bitten leg was enormously swollen to the very ends of the toes, which, on being held up to the light, were seen to be distended with red serum. *Third day after bite on thigh.*—Frog, **Ca**, 40, l. 4, p. 248.

607. From the wounds a bloody serum continually oozed all that day and all the next day—some drachms. On the third day the frog was very sluggish. The bitten leg was enormously swollen to the very ends of the toes, which, on being held up to the light, were seen to be distended with red serum. The skin of the limb was also soaked, in places, with extravasated blood. *After bite on thigh.*—Frog, **Ca** 40, p. 248.

608. From the wounds a bloody serum continually oozed all that day and all the next day—some drachms. *After bite on thigh.*—Frog, **Ca** 40, p. 248.

609. Bloody serum oozes from the wound for many hours. *After bite on thigh.*—Frog, **Ca** 39, p. 248.

610. Parts darker colour than usual, and presented a fluctuating mass of fluid beneath skin. *Twenty-five hours after bite on back of pelvis.*—Frog, **Ca** 38, l. 3, p. 247.

611. Skin of bitten limb soaked, in places, with extravasated blood. *Third day after bite on thigh.*—Frog, **Ca** 40, l. 6, p. 248.

612. The injected limb was much swollen, infiltrated, and discolorued with sanguineo-serous effusion. *After injection into thigh of a quarter of a grain of dissolved dried venom.*—Guinea-Pig, **B** 12, l. 11, p. 209, *P.M.*

613. The wound was surrounded by half an ounce or more of dark fluid blood. The vessels in the neighbourhood were full of a similar fluid; but there was no vascular redness like that of acute inflammation. The muscles in the track of the bite were remarkably

softened, and could be torn with the utmost ease. *P.M.*—RABBIT, Ca 26, l. 10, p. 245.

614. The skin beyond the bitten nostril was puffy and tumid, the nostrils exuding bloody mucus. *P.M. immediately after death.*—DOG, Ca 10, l. 14, p. 242.

615. A good deal of subcutaneous, submuscular, and intermuscular sanguineous extravasation, of a very dark purple colour in neighbourhood of bite. *P.M. shortly after death from bite on back of neck.*—GUINEA-PIG, Ca 24, l. 11, p. 245.

616. The whole muscular and areolar tissue of the leg and thigh, half way up and down the limb, was dark with infiltrated blood. About the wound the swelling was due to a mass of blood partially coagulated. The extravasated blood extended through the limb, and on the inside it passed half way up the sartorius and adductors, and along the sheath of the vessels to within two inches of the femoral ring. Nearly an inch of the sheath was clear of it, but one half inch below the ring the tissues were shaded with blood, and the same appearance was seen around the ring itself. From this point the extravasation extended under the peritoneum into the pelvis, and on the inner face of the ileum. The colour of the tissues thus stained was of a brilliant scarlet. *P.M. shortly after death.*—DOG, Ca 6, l. 17, *et seq.*, p. 239, v. also *P.M.*, DOG, Ca 7, l. 25, *et seq.*, p. 240; and DOG, Ca 8, l. 9, p. 241, and DOG, Ca 9, ll. 24, 33, 29, pp. 241, 2, and DOG, Ca 10, l. 14, p. 242.

617. Some extravasation of blood in cellular membrane in neighbourhood of wound. *P.M. sixteen hours after death from bite on hand.*—SOPER, C 33, l. 121, p. 236.

618. Beyond the limits of the abscess blood was extravasated into the cellular membrane; and this appearance was observable in the back, on same side, as far as the loins and on the side of the chest. *P.M. sixteen hours after death from bite on hand.*—SOPER, C 33, l. 133, p. 236.

619. The muscles near the wound were softened and readily torn. *P.M. twenty-four hours after death.*—DOG, Ca 7, l. 25, p. 240.

620. The muscles were brownish instead of red. *P.M. four hours after death from bite on arm.*—LAKE, C 26, l. 41, p. 225.

621. Post-mortem rigor so strong as to snap a small cord with which the legs were tied apart. *P.M. twenty-four hours after death.*—DOG, Ca 7, l. 22, p. 240.

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Pathogenetic Commentary.

Most of the cutaneous symptoms of Crotalus have occurred after bites or injections, and they may therefore be somewhat of the nature of topical effects; still, many of them are undoubtedly idiopathic; amongst these are coldness and cold perspiration, itching, dryness, heat, desquamation, falling off of the hair, various eruptions such as acne, vesicles, pustules, furuncles, and local and general puffiness. Some may be of a less positively idiopathic nature, such are quivering, trembling, general soreness, redness, swelling—both serous and hæmorrhagic—and hæmorrhage; the hæmorrhage is principally venous, and it induces every kind and degree of discolouration—red, black, yellow, mottled, greenish, blueish, &c. &c.; there may even be softening, gangrene, mortification and sloughing, during life. After death, in sub-acute and chronic cases, the skin and muscles in the neighbourhood of the wound are found infiltrated—soaked—with serum and fluid, degraded blood, or in a state of gangrene, mortification, sloughing; and even parts at a considerable distance from the wound are frequently found in a similar condition, v. Ss. 611—621, pp. 348, 9.

v. § 10, p. 155.

Therapeutic Application.

In consequence of this general and destructive action of Crotalus on the cutaneous structures, its therapeutic sphere and usefulness in

cutaneous affections are very extensive and important; indeed, there are very few skin diseases in which its exhibition would not be attended with benefit; and the greater the evidence of disorganisation the more positively is it indicated. It is especially useful when the cutaneous affection is of a gangrenous character, or there is anything septic in its origin, or it occurs when the bodily condition is unhealthy, or the vitality low—erysipelas from vaccination for example.

In relation to Crotalus, we may take skin diseases in the following order:

General Erysipelas; particularly œdematous; phlyctenous, gangrenous; especially when occurring in the course of the zymotic diseases, or other blood disease, or in debilitated or broken-down constitutions, old inebriates, &c.

Local Erysipelas; especially gangrenous, or from vaccination, poisoned wound, dissection wound, &c. In these cases it is almost specific.

Phlegmonous Erysipelas; especially in broken-down constitutions, and particularly in the later stages when there are deep-seated sloughs or suppuration with secondary absorption, low fever, and exhaustion.

Stings of Insects; such as bees, wasps, mosquitos, spiders, scorpions; and especially when these assume an erysipelatous or gangrenous character; and whether the affections be recent or of long standing.

Syphilis; **primary**, if the chancre become at all gangrenous or phagedænic; **secondary**, for mucous tubercles, and phagedænic and deeply penetrating ulceration of the mucous membranes, necrosis of cartilages, &c.; **tertiary**, for fœtid and hæmorrhagic ulceration, and if the brain, liver, or kidneys become implicated.

Pemphigus; especially with low, typhoid conditions, and when the contained fluid assumes a dark or sanguineous character, or gangrene threaten.

Ecthyma; especially under the above-named conditions.

Anthrax, Malignant Pustule; especially if of a dark colour, with much fever (Fièvre charboneuse) or threatening gangrene, or if there be several of them, or if occurring in a constitution already broken down by disease or bad living, or there be accompanying fever of a low type; and particularly in the later stages if there be sloughing or hæmorrhage.

Dissection Wounds; especially when these occur in low, debilitated, exhausted, or broken-down constitutions; and particularly when the symptoms are those of phlegmonous erysipelas, or there be much œdema, gangrene, sloughing, pyæmia, or accumulations of dirty pus in distant parts, or typhus condition supervene. In such cases Crotalus may be relied upon as the principal remedy.

Felon (whitlow); especially if from septic absorption, or if it be of a more than usual unhealthy kind, or it inflame much, or slough, or if it occur in a person in a low, unhealthy state of body.

Carbuncle, Furuncle (boil) *and Suppuration of Glands;* especially when occuring in broken-down constitutions, or there be a crop of them, or there be low fever, or they tend to slough, or the matter be dirty or hæmorrhagic.

Chilblains; especially if inflamed, or threatened with gangrene, and in low bodily conditions with weak nervous systems, or languid circulation.

Burns and Scalds; especially in severe cases, and in the later stages to assist the separation of the dead parts, and particularly if gangrene or extensive ulceration supervene, or there be much secondary fever, or the fever assume a typhus type; and more especially if the constitution be already broken down by disease or bad living.

Ulceration; especially phagedænic, sloughing, varicose, irritable, bubo, "soft sore," mercurio-syphilitic, with offensive discharge, &c., and particularly in constitutions broken down by previous disease or bad living, and in inebriates.

Stigmata, Petechiæ, Ecchymoses, Mottling, Discolouration; especially when they occur, as they generally do, in debilitated, broken-down constitutions, or there be a poor depraved state of the blood.

Purpura, Peliosis, and other hæmorrhagic general diseases, v. Circulatory Organs, p. 326.

Elephantiasis, Lupus, Alopæcia, Acne, Herpes, Eczema, Prurigo, Lichen, Urticaria, Erythema nodosum, &c.; in each of these Crotalus will frequently be indicated, and will surely be found useful in many cases.

Perspiration, coloured; especially axillary. v. S. 557.

Clinical Experience.

Clinical experience with Crotalus in the treatment of diseases of the skin has not yet been extensive. The present writer has seen much benefit result from its use in Felon, Furuncle, Chilblains, Varicose Ulcers, Ecchymosis, Petechiæ, Pustules, Acne, &c. And the following case occurred in his practice: *Petechiæ;* MR. B—, aged 48, who had lived freely in youth and had syphilis. From 24 years of age to 35 he suffered on and off with severe hæmatemesis and melæna, followed by general debility and weak heart with chronic rheumatism, headache, constipation, attacks of vertigo, jaundice, &c., and when about 44 he became invalided, and suffered much with dizziness, fainting, and irregular action of the heart; and petechia now broke out over the whole body, especially the lower extremities. Several remedies were used, but he benefited most under mer.—k-hy.—pho.—and crt. It was whilst taking *Crt.* 6 that his petechia disappeared, and he made most progress. He made a good recovery; and is now, at 52, in fairly good health.

Erysipelas after vaccination: M. T—, aged 4 months, healthy, and of a healthy family; vaccinated November 14th, 1883, with calf lymph, fresh, and in a tube procured from London for the purpose. All three insertions took effect severely, and on the morning of the eighth day had extended so as to touch each other: their centres were blackish, and the circles filled with dark lymph; they were surrounded by a patch of inflammation, in the form of a square, one and a half inch in diameter; and there were a few small red, raised papules on the arm and forearm. The child had been restless and feverish. *Crt.* 6

every two hours; and a hot bread poultice to the vaccination spots. The child had a very restless day and night, and the next morning (*i.e.* of the ninth day) I found the skin of nearly the whole upper extremity inflamed, dark red, and thickened, as evidenced by the sharply-defined edges of the few remaining patches of healthy skin. The skin of the shoulder, neck, chest, abdomen, and back was in a similar condition; and on the lower extremities the eruption was in small patches, leaving more healthy skin than eruptive. There were much fever and restlessness. Continue *Crt.* 6, and the poultices. The child was very restless and feverish during the day and night, though less so than the previous day and night; and the next morning (*i.e.* of the tenth day) all the symptoms were ameliorated, and the eruption was becoming pale, except about the elbow, where it was blackish. On the eleventh day all the symptoms had disappeared: the child was apparently well, and there was no eruption or redness of the skin. The vaccination marks looked fairly healthy, and had not been burst.

Dr. Bryce, of Edinburgh, sends the following case of Pustular Eruption after vaccination:—"Mrs. B— wrote to me from Ireland about her baby. It had been vaccinated when three months old. On the ninth day the arm was much inflamed; and about the twelfth day a discoloured 'dirty'-looking crust formed, with discharge of dirty-looking pus and the formation of other unhealthy-looking crusts. At the end of three weeks, there being no improvement, the arm was poulticed; and soon after this the part healed up. But as soon as it had quite healed the neck and behind the ears became raw and had a scalded appearance. After this, ointment was applied, and the part healed. But, in a few days, 'spots' appeared on the back of the head, across the shoulders, in the armpit of the vaccinated arm, and over the breast. The spots were pimples and pustules from the size of a pin's head to that of a split pea. They were especially numerous on the vaccinated side. After the eruption had lasted two weeks Mrs. B— sent for the doctor. He gave some medicine and the eruption disappeared; but in a short time returned as bad as before. Wishing not to give any more allopathic medicine she did nothing for it for a fortnight: after this she wrote to me, June 15th, 1882; I sent *Crt.* 6. In her next letter, dated June 29, she writes:—'I am happy to say all the spots have disappeared except one or two on the shoulders, and they too appear to be dying away.' Up to now, October, 1883, there has been no return."

"In his recent (1883) severe attack of lymphangitis and septicæmia from dissection wound, Dr. I. T. Talbot, of Boston, U.S., tells me he relied on Crotalus."—Dr. Richard Hughes, *special communication.*

For cures of *Stings of Venomous Insects*, v. "Upper Extremities," 'Clinical.'

As well as being exhibited by the mouth in these cases of skin-disease the introduction of crotalus topically by means of scarification is advisable and likely to expedite the cure. v. Mode of Administration, p. 194.

With the more familiar, very similarly-acting serpent-venom, lachesis, there is much recorded experience in the treatment of skin diseases. v. *Jahr's New Manual,*

ii, 56, and *Amer. Hom. Rev.*, 1863, pp. 555—562. DR. HAWKES, of Liverpool, who has an immense accoucheur practice, says lachesis is an almost unfailing remedy in the erysipelas from vaccination. DR. C. HERING reports a case of *Ecthyma*:—A woman who had had charge of a child with the itch. She had itching on the whole body, and on the hands and feet; *after burning pains* there appeared itch vesicles; attended with much itching, throbbing, heat, there formed a large diffused red swelling; here and there among the small vesicles a larger vesicle the size of a nut was seen, at first full of water, but afterwards containing pus, and there was great inflammation at the time as far as the elbow and knee; some of the pustules instead of being yellow were dark blue, with burning throbbing pain in the whole swelling, as if the flesh were being torn from the bones; the attacks made her almost desperate; the pains attack the head, teeth, breast, and back, and dreadfully severe pain is felt in the head, which causes a sense of sickness and nausea; throbbing and beating are felt in the head by every movement. After the attacks she lies in a stupified sleep; the pains are worst at night; she has constant thirst, but drinking makes her sick. Sometimes the itching goes off, and then she is very short of breath and full of anxiety. After the first dose of lachesis she was better, and the headache was gone. After some days a second dose was necessary. In a week she was quite cured, except the remains of stiffness in the joints of the fingers. *Brit. Journ. Hom.*, ii, 375. DR. C. WESSELHOEFT relates the following cases:—1. *Ecthyma*: Mrs. P—, æt. 30; after having had three abortions suffered with a pustular eruption of the back, legs, and ankles, consisting of isolated pustules, rapidly filled with sero-purulent matter and surrounded by an inflamed halo. Thery varied from the size of a pea to that of a five-cent piece, and soon dried into dark hard scabs, which were easily knocked off leaving red moist surfaces extremely sensitive to contact with the atmosphere or bed-clothes. Itching was intense, especially at night, often changing to severe burning stinging. Improvement set in immediately after taking lah. 30, and within four days the eruption dried up, and she made a rapid recovery. 2. *Tertiary Syphilis*: Mr. C. H—, who, along with many other symptoms, had "peculiar rheumatic pains, prostration and easy perspiration, nodules on forearms, and bluish-black spots on legs." Rapidly cured by lah. *Brit. Journ. Hom.*, xxii, 487, 491. DR. C. DUNHAM says: "In 1850, while assisting in the autopsy of a woman who had died of puerperal peritonitis, the writer (Dr. D— himself) received a dissection wound in index finger of left hand. Within a week the finger had quadrupled in size, the hand and forearm were much swollen and œdematous, a hard, red line extended from wrist to axilla. The axillary glands were swollen. The arm and hand were intensely painful; the whole left side was partially paralysed. The constitutional symptoms were: extreme prostration, causing the disease to be at first mistaken for a typhus, low muttering delirium at night, marked aggravation of suffering and prostration on awaking from sleep. The general condition grew steadily worse; abscesses forming under the deep fibrous tissues of the finger and hand. No homœopathic practitioner was in the neighbourhood. The allopathic surgeons in attendance advised calomel and opium, but gave a very discouraging prognosis. The patient refused to take any drugs, determining to trust the issue of the case to lachesis. The first dose (of the 12th) was taken on the third day of the illness, and a dose thrice daily for five days, at the end of which period the constitutional symptoms had substantially vanished. The recovery of the finger was slow but complete. The effect of the lachesis could not be mistaken by the patient." . . . . "In the year 1853 there prevailed, quite extensively, in Brooklyn, an epidemic of what was called 'malignant pustule.' A furuncular formation appeared, generally upon the lower lip, attended with severe pain, and frequently surrounded by an erysipelatous areola. The most marked constitutional symptom was a very rapid and excessive loss of strength, the patient being reduced from vigour to absolute prostration within the space of from twenty-four to thirty-six hours. Allopathic physicians at first resorted to local application of nitrate of silver to the pustule. In those cases, thus treated, which came under my personal observation, death followed cauterization within twenty-four hours. In eight cases treated by myself, lachesis was the only remedy used. It relieved the pain within a few hours after the first dose was given, and the patients all recovered very speedily." *Materia Medica*, ii, 247, 249. And he refers (p. 251) to several cases of carbuncle rapidly cured by the same remedy. In his *Science and Art of Surgery*, DR. E. C. FRANKLIN (who was an army surgeon during the war

between North and South, and had charge of a military hospital), "DR. FRANKLIN confirms from his experience DR. DAKE's recommendation of lachesis in traumatic gangrene. 'I have used this remedy in a number of cases of gangrene following wounds, and have never been disappointed in its results. In a case of compound comminuted leg fracture, terminating in gangrene and threatening speedy destruction of the limb, the gangrene was quickly checked by the internal and external use of lachesis, the inflammation subsiding, and the healing process moving on to a complete cure. In another case of compound dislocation of the ankle-joint, with fracture of the malleolus externus, followed by gangrene, lachesis effected a speedy cure—the patient making a good recovery under the surgical treatment employed. I cannot too highly recommend the use of this agent for gangrene.'" Review in *Brit. Journ. Hom.*, xxvii, 322. "Aretæus relates the case of a man suffering from elephantiasis, who, drinking of wine from a cask in which a viper had ensconced itself, drunk to satiety to forget his affliction or end it; indeed, seeking at once the end of his life and his disease. He got drunk, and lay on the ground like one dying. After he rose from his drunken lethargy, his hair and his nails fell off, and all his members began to waste; but after a while he had new hair and nails, and new healthy flesh, and cast his skin as the snake its slough, and became quite a new man." *Brit. Journ. Hom.*, viii, 31. And DR. NAVARRO relates several cases of carbuncle rapidly cured with tarantula. Boericke and Tafel's *Bulletin*, August, 1880.

§ 21. Symptoms connected with Sleep and Dreams (622—632).

v. § 9, p. 154.

622. Uncommonly sleepy at midday first day, almost irresistible midday second day.—SCHMÖLE, C. H. 2720, **A** 1, p. 195.

623. Starting during sleep, sleeplessness. *First day.*—MARTIN, **A** 9, l. 2, p. 200.

624. Dreams he is travelling about all over the world.—SCHMÖLE, C. H. 2809, **A** 1, p. 195.

625. At night many dreams of quarrelling and fighting; dreams he has quite broken with his father, who would no longer recognise him as his son because he has adopted homœopathy.—SCHMÖLE, C. H. 2816, **A** 1, p. 195.

626. Horrible dreams every night, sometimes it was herself that was in difficulties and dangers, at other times it was members of her family, and once it was her baby being murdered before her eyes. During a week whilst taking Crotalus 3, two drops every two hours. —MRS. T—, **A** 6 *a*, l. 6, p. 198.

627. After a bite on finger in morning a restless and sleepless night.—WDH., **C** 23, l. 8, p. 222.

628. No sleep first or second, and scarcely any third or fourth, night. *After bite on finger.*—BURNE, **C** 15, ll. 10, 18, 21, p. 218.

629. He got no sleep until the fourth night, when he put on a bread-and-milk poultice, after which he slept well as long as he kept the poultice moist, but on its becoming dry the hand became again too painful to allow him to sleep, and the skin was so dry that he had to continue the poulticing for several days. *After a bite on palm.*—SHIPMAN, **C** 8, l. 29, p. 216.

630. Dreams about horrid places, about rolling amongst old rocks, that he is a white hawk cut into pieces, that his feet had grown into two

hickories, and he is depressed thereby. His previous habit in illness was to dream pleasant dreams. *After a bite on arm.*—BNTL., C 16, l. 35, p. 219.

631. The breathing was still jerking but rapid; the bird crouched, as if asleep, the eye natural, the pupil perhaps a little contracted. *Sixteen minutes after being bitten by two snakes.*—PIGEON, Ca 16, l. 7, p. 243.

632. The bird drooped a little and was disposed to sleep. *Three hours after bite in which nearly all the venom was lost.*—PIGEON, Ca 18, l. 2, p. 244.

INDEX (*local symptoms* 622—632).

Dreams, 105, 624, 625, 630; horrible, 626, 630.
Drowsiness, 105, 652.
Sleepiness, 7, 122, 622, 631, 632.
Sleeplessness, 105, 623, 627, 628, 629.
Starting during sleep, 623.

Pathogenetic Commentary.

The drowsiness and sleepiness appear to be the reaults of idiopathic action of Crotalus on the cortical substance of the cerebrum, though they may partly also from the disordered circulation and the morbid blood circulating within the brain. The sleeplessness appears to be partly a secondary effect resulting in part from the pain and misery. v. Ss. 124—132.

v. § 10, p. 155.

Therapeutic Application.

The place of Crotalus in disorders of sleep is in the torpor and drowsiness of the invasion or termination of the zymotic or septic diseases or other toxæmiæ, such as albuminuria, menstrual irregularities, hepatic or cardiac disease, &c., that is, those resulting partly from the circulation through the brain of a specific poison, or impure or disorganised blood. A good indication for the use of Crotalus is when the patient feels worse or many of the symptoms are aggravated after sleep. It is also pointed to by the sleeplessness of delirium tremens, and that from nervous and mental distress connected with bodily suffering but out of all proportion to the suffering.

Clinical Experience.

There has not yet been recorded much clinical experience with Crotalus in disordered states of sleep; but the present writer has frequently observed the calming of *Disturbed Sleep* and the removal of *Sleeplessness* and of *Drowsiness* when the patient has been taking Crotalus for some nosological disease, such as morbilli, scarlatina, typhoid,

palpitation, &c., v. "Face," 'Clinical,' Miss K—, p. 280. And the following case occurred in his practice :—Mr. G—. He had lived freely in youth, and suffered from syphilis, mercurialisation, polypus, &c., and had taken alcohol freely all his life. After he was fifty-five years of age, and up to his death at sixty-two, he suffered much from chronic sleeplessness. During these seven years many remedies were prescribed with varying benefit. *Crotalus* was frequently used, and always with marked relief, sometimes causing him great surprise, and that notwithstanding his taking large doses of hydrate of chloral.

With the more familiar and very similarly-acting serpent-venom, lachesis, there has been considerable experience in disorders of sleep. v. *Jahr's New Manual*, ii, 50.

§ 22. Febrile Symptoms (633—643).

v. § 9, p. 154.

633. Much palpitation and trembling of heart, and feeling as if heart tumbled about ; with heat and itching of palms and flushing of heat throughout the body ; lasting whole day, and worse next morning, so that she refused to take any more of the drug. *Whilst taking three drops every two hours, 3rd dil.*—E. J. H., **A** 5, l. 4, p. 197.

634. Febrile heat ; not dependent on increase of pulse. *Eleven hours after inoculation.*—Manz., **B** 3*a*, ll. 8, 38, 66, 71, 75, pp, 205, 6.

635. "Nothing was of higher interest than the fevers from which the inoculated suffered. They resembled yellow fever in its initiary stage. Nothing was wanting—expression of countenance, pain in loins, headache, the symptoms of the gums, and those fevers which made their appearance in such an alarming manner did not last longer, in five out of seven cases, than from twelve to forty-eight hours."—Manz., **B** 3*a*, l. 72, p. 206.

636. Cold rigors running over her ; deadly sick ; pulse 120, small, quick, and threadlike. *Eight hours after bite on ankle.*—Negress, **C** 14, l. 4, p. 218.

637. Complained of feeling cold, and vomited. *One hour after two bites on hand.*—Drake, **C** 28, l. 27, p. 226.

638. Surface cold and bathed in perspiration (passed off under whiskey and ammonia). *Two hours and a half after bite on instep.*—Miss R., **C** 5, l. 5, p. 213.

639. Profuse perspiration (which lasted for three hours), with intense redness of whole body, especially on bitten limb. *Three hours and three quarters after bite on hand.*—Mach., **C** 29, ll. 33, 40, 43, p. 229.

640. Great heat over whole surface of body, quick pulse ; salivation, which lasts fourteen hours [v. l. 86], saliva dark colour, viscid, and expectorated with difficulty. *Five hours after bite on hand.*—Mach., **C** 29, ll. 43, 49, 54, p. 230.

641. Partially delirious ; pulse very weak, and ranging from 115 to 130 ; respiration difficult and hurried ; skin hot and dry ; eyes red and firy ; hand, arm, and shoulder much swollen ; and the limb

insufferably painful; continuing in this state for three days. *Ten hours after bite on finger.*—BURNE, C 15, ll. 4—14, p. 218.

642. Dry consuming fever tortures him; with dry tongue and incessant thirst. *After a bite.*—SPIX, C 31, l. 5, p. 233.

643. Two hours after removing ligature from arm, the whole side turned black; and he soon afterwards bled at the mouth and became feverish; and he continued feverish and spitting blood for four days. *After bite on hand.*—BNTL., C 16, l. 25, p. 219.

644. The pain continued to rage in the arm, and the fever to be violent, and by turns he was delirious for an hour or two. This happened three or four times. *After bite on hand.*—BNTL., C 16, l. 28, p. 219.

645. Violent thirst and diarrhœa, with great anxiety and uneasiness, and burning pain throughout body. *Fifteen minutes after bite on foot.*—WOMAN, C 12, l. 4, p. 217.

646. After the primary effects of the poisoning had somewhat subsided local inflammation supervened; the arm swelled and became very painful; the pulse increased in frequency; the tongue became furred; the inside of arm below axilla sloughed; purging supervened; in the night of eleventh day he had a rigor, and the next day a large abscess was found on outside of elbow, which on being opened discharged half a pint of brown matter with sloughs of cellular membrane floating in it. Two days after this he had another rigor; pulse was 120; voice feeble; delirium at intervals; skin near axilla became gangrenous; purging continued; and he died after two days more. *Seven days after bite on hand.*—SOPER, C 33, ll. 87—100, p. 235.

647. Annually at the same time pains, swelling, and fever, with blue and yellow spots on body. *After a bite.*—SCHŒPF, C 20 (C. H. 3313) p. 221.

648. Cerebral disturbance (anguish and inquietude?), quick pulse, difficulty in movement of lips, somnolency, and sensation of constriction in throat; he felt cold and covered himself. *Two hours after bite on hand.*—MACH., C. 29, ll. 27—37, 78, pp. 229, 30.

649. Cloaca temperature 104·5° F. *Thirty-six minutes after being bitten by two snakes.*—PIGEON, Ca 16, l. 10, p. 243.

INDEX (*local symptoms* 633—649).

Chilliness, 634, 637.
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Eyes red and firy, 641.
Fever, 642, 643, 644, 652; recurring annually, 647; like yellow fever, 635.
Headache, v. "Head."
Heat, burning, throughout, 634, 645; flushing of do., 633; of palms, 633; of surface, 640; and dryness, 641.
Perspiration, cold, 638; profuse, 639.
Pulse, very rapid, 641, v. "Circulatory Organs" p. 324.
Redness of skin, intense, 639.
Rigors, 67*a*.
Temperature, elevation of, 649; reduction of, 408.

Pathogenetic Commentary.

High sthenic fever, or primary inflammatory fever, is not well represented in the symptoms of Crotalus; but low asthenic fever and

secondary inflammatory fevers are, and very distinctly, especially those arising from septic or zymotic influences. Low asthenic septic fever is indeed the characteristic constitutional condition in Crotalus poisoning, just as gangrene and hæmorrhage are the topical effects. This will be seen to be so by reference to the "Modes of Death," pp. 175, 176; the "Causes of Death," pp. 176, 177; and the "Constitutional Effects," pp. 179—81. v. also "Some Pictures of Crotalus Poisoning." *Brit. Journ. Hom.*, xl, 245, 248, 251, 254, 257, 259, 260. By reference to these it may be seen that in the pathogenetic effects of Crotalus are very complete representations of not only the onset but of the course and termination of most low fevers, whether septic or zymotic; and that although the fever of Crotalus bears a remarkable resemblance to that of the zymotic diseases—variola, scarlatina, typhus—it is more exactly analogous to that of septic poisoning and secondary infection, such as puerperal and hectic, and the fever attending dissection wounds, traumatic erysipelas, secondary absorption from the throat in scarlatina and diphtheria, and from the skin in the maturation stage of variola; and that attending local infective diseases, such as malignant pustule, carbuncle, phagedæna, &c., and that resulting from the stings of venomous insects, such as wasps, bees, spiders, &c. In all these cases, the serpent-venoms, and especially Crotalus, are pre-eminently homœopathic and rapidly curative.

Amongst the "contingent" fever symptoms of Crotalus are the following, very distinctly marked and in the order and combinations of septic and zymotic fevers, viz. yawning, sudden pallor of countenance, general chills, cold surface, cold sweat, and absolute reduction of temperature, flushes of heat, flushed face, hot burning surface, redness of skin, and absolute elevation of temperature, papules, vesicles, pustules, blotches, petechiæ; general malaise, languor, tremulousness, and staggering; feeling as beaten all over, extreme prostration; confusion, irritability, feeling of intoxication, delirium, sleepiness, torpor, lethargy, coma, dreaming, drowsiness, and collapse; restlessness, sleeplessness, vertigo, fainting, rush of blood to head, heavy congested headache, throbbing in head; dull, heavy, congested eyes, pressed out eyes, sunken eyes, pale face, flushed face, bloated, besotted countenance, cold sweat on face, dark circles round eyes (v. Face—commentary); sensation of exhaustion at the heart; frequent, soft, feeble, fluttering, flagging, intermittent, irregular, trembling pulse; oppression on the chest, embarrassed, quick, sighing respiration; thirst, want of appetite, nausea and vomiting, especially on attempting to stand, retching, sinking at pit of stomach, craving for stimulants; scanty urine, high coloured and of high specific gravity, muddy, suppressed; diarrhœa, convulsions, &c.

v. § 10, p. 155; also p. 162.

Therapeutic Application.

In accordance with this pyretogenetic power of Crotalus its therapeutic sphere and usefulness in the treatment of low febrile states and

septic and zymotic fevers are both extensive and important. In the fever resulting from septic absorption, and in purpuric cases of the zymotic diseases Crotalus is perhaps the most generally and most frequently indicated remedy yet discovered. Hence it is frequently required in the treatment of:

Pyæmia; especially when arising, as it generally does, from absorption from erysipelatous, gangrenous, or other unhealthy suppurations, or in very low stages of vitality; and when it is accompanied by frequent rigors, sweatings, low typhoid state, rapid weak pulse, jaundice, or great prostration; or by phlebitis, extravasations, abscesses.

Hectic Fever; for its indications in the fever attending suppuration, ulceration, burns, and scalds, maturation stage of variola, compound fractures, lacerated wounds, dissection wounds, cellulitis, erysipelas, malignant pustule, carbuncle, stings of insects, phagedæna, &c., v. "Skin" and "Extremities;" for that attending diphtherial and scarlatinal absorption, v. "Throat," for that attending secondary and tertiary syphilis, v. "Skin" and "Generalities;" and for that attending cholera, v. "Stools."

Variola; especially in that, as Dr. HUGHES says, "frightful modification of the disease which may manifest itself from the first, or may be induced at any point of its progress. In the former case we call the whole malady purpura variolosa; in the latter we say that the smallpox has become hæmorrhagic. Some serious change has taken place in the blood or its vessels, or both, which leads to its extravasation throughout the body; and the result is almost inevitably death. . . . I have myself suggested the snake poisons as the most homœopathic remedies for this condition." *Therapeutics*, i, p. 50. Here, if any medicine can be of any service, Crotalus is that remedy; and it may be introduced subcutaneously as well as by the mouth. v. Mode of Administration, p. 194. It is also, perhaps, the most reliable remedy for the secondary fever, which comes on during the maturation of the pustules in confluent cases.

Vaccinia; especially when from the unhealthy state of the child vaccination brings on fever, and particularly if there be induced erysipelas, gangrene, or sloughing; also for vaccination with syphilitic infection.

Morbilli; especially the malignant or purpuric form; and for such sequelæ as gangrene of the mouth or genitals; and for retrocession of the eruption; also in the later stage when the eruption remains long, or reappears as a mottling.

Scarlatina; especially when in the primary invasion there is evidence of great toxication, vomiting, general collapse and coldness, or the brain be greatly oppressed, coma, convulsions; throat livid and rapidly swelling, much œdematous swelling at the angles of lower jaw, chin raised and head thrown back, eruption patchy, dark or petechial, pulse extremely quick and feeble, frequent epistaxis, face dusky; moaning and tossing about, or heavy, dull and stupid; and when, afterwards, the swelling of fauces and tonsils seems to threaten suffocation or gangrene, or there is much puffiness round neck, nose-bleed, tenacious sanguineous mucus from mouth and nostrils, breathing irregular, jerky;

or when, later still, there is secondary infection by absorption from the gaugrenous and sloughing fauces, inducing a low typhoid state (sapræmia); also, for the complications, œdema glottidis, laryngitis, meningitis, &c.; and for the succeeding dropsy, especially when the urine is of a dark, smoky colour, is bloody or albuminous. In such cases Crotalus will do all that medicine can do; and the more malignant, especially if hæmorrhagic, the more is it indicated. And here, again, it may be introduced subcutaneously, as well as by the mouth. v. Mode of Administration, p. 194.

Writing on the remedies for malignant scarlatina DR. P. P. WELLS says: There is another class of remedies which merit far more attention in the treatment of this variety of cases than they have hitherto received. The allusion is to the *serpent poisons*. Of these, that of the *Crotalus horridus* is deserving of especial attention. Those who have read descriptions of the progress of cases to a fatal termination, after the bite of this serpent, will be struck with the similarity of the phenomena of these cases to those of the variety of the disease we are now considering. This poison, also, goes direct to the central forces of life, in its initial attack, and proceeds to *gradually* paralyze and extinguish the living functions, till all are lost in a manner so like the action of the scarlet fever poison, that even the most unskilled observer cannot fail to perceive the resemblance."—*Amer. Hom. Rev.* iv (1864), p. 355.

Puerperal Fever—Metria—even in those malignant cases where, as DR. TYLER SMITH says, "the blood resembles that of persons killed by lightning, or prussic acid:" and whether it assume the form of uterine phlebitis, pelvic cellulitis, pyæmia, or peritonitis, or result from zymotic infection. Subacute and chronic cases of Crotalus Poisoning present most of the essential symptoms of sapræmia and even septicæmia; Crotalus is, therefore, eminently homœopathic to such affections. And here, too, it may be introduced subcutaneously.

Typhus; when there is evidence of great primary toxication, with much oppression of the nervous centres; the eyes congested, countenance heavy, dull, bloated, besotted; the eruption dark, purple, copious, &c. Malignant Typhus, Gaol-Fever. And when, during the second week, the heart becomes markedly soft, causing the systolic sound to become nearly inaudible and the pulse to be soft, flagging, tremulous; and when there is great and distressing restlessness, much stupor, twitching, jerking, tremulousness, sinking down towards foot of bed, or deafness; and if pneumonia supervene, or œdema glottidis, swelling of salivary glands, diarrhœa, albuminuria, or suppression of urine; in fact, in all cases where the blood-poisoning is severe, or a tendency to decomposition seems impending. Also for bedsores, gangrene, or erysipelas; and in cases occurring in old, or intemperate subjects.

Relapsing Fever; especially when there is a tendency to syncope, hæmorrhage, epistaxis, menorrhagia, or to petechial eruption, or œdema of the lungs or legs, or effusion into the joints, ophthalmia, diarrhœa, or dysentery; and when occurring in old, or intemperate subjects.

Typhoid or Enteric; the symptoms of Crotalus Poisoning do not present much general resemblance to those of enteric fever. In the

former case the general character is that of blood and tissue *degradation*; in the latter, of *irritation*; the same may be said as to the diarrhœa and hæmorrhage.

Yellow Fever; the homœopathicity of Crotalus to yellow fever in all its varieties and stages has been so well and fully pointed out and insisted on by Drs. Neidhard, Holcombe, Valdez, Mitchell, and others that it is needless here to do more than simply refer to these authorities. v. *Bibl.*, III *b—i*, pp. 162, 163.

Cerebro-spinal Fever; the remarkable analogy between the symptoms and post.mortem appearances of Crotalus Poisoning and those of cerebro-spinal, "spotted" or "malignant purpuric" fever in all its stages makes it certain that in Crotalus we have a most appropriate remedy for this fever, which Dr. Bushrod W. James, of Philadelphia, says "is one of the most insidious and dangerous forms of a typhous type of disease that the profession has been called upon to encounter for many years."—*Brit. Journ. Hom.*, xxiii, 394.

Plague; this being, apparently, a typhus fever complicated by carbuncles and engorgement of the lymphatic glands, and Crotalus being one of the best remedies for each of these constituents it will doubtless be found one of the best remedies in the treatment of plague, of which, indeed, Crotalus Poisoning presents a very complete picture.

Bilious Remittent; from the great resemblance of this fever to the true yellow fever, Crotalus will, doubtless, prove to be one of the principal remedies for bilious remittent.

Glanders; "In the treatment of this disease," says Dr. Hughes, "Crotalus or lachesis would be indicated as the sole remedy where malignant symptoms—as black bullæ and tendency to gangrene—appear."—*Therapeutics* i, 132.

Clinical Experience.

It is in the treatment of fever that Crotalus has hitherto gained its most signal triumphs. Here it has, alone, filled the place imperfectly occupied by lah.—rhs.—pho.—ars. Its power over fever of malignant type has been the theme of four valuable essays—those of Drs. Neidhard, Holcombe, Valdez, and Manzini; v. *Bibliog.* III *c*, *d*, *e*, *f*. And it was its power over malignant (hæmorrhagic) scarlatina that induced the present writer to take the interest in it he has done. For the last ten years the present writer has used Crotalus in all case of fever of all kinds when anything of a hæmorrhagic, or putrescent, character has been exhibited, and with the most prompt and marked effect in removing the hæmorrhagic symptoms and checking the tendency to putrescence. His two first cases of scarlatina will serve as samples of many successes with this medicine:

Scarlatina maligna (hæmorrhagic):—Case 1.—Miss H—, æt. 9, was apparently quite well on the 5th of October, 1870, but in the evening she complained of sorethroat, with headache and dizziness. On examination the fauces and tonsils, especially the left one, were

found dark red and swollen—œdematous. *Bel.* was ordered every two hours.

The only exposure to infection that could be traced was that the cook was laid up with diphtheria; and the only traceable cause for that was that scarlatina was in the house of her family, and she had been there on Sunday, September 25th.

During the night the patient was very restless and feverish, and retched a good deal, getting up some dirty-looking slimy mucus. At eight o'clock next morning she was found to be extremely weak and very tremulous; her pulse was 160; the skin was dry and burning hot, and there was some brownish miliary rash on the chest; the tongue was furred, the mouth dry; great thirst, but drinking only a little at a time, apparently because swallowing was painful; the fauces and tonsils were mottled with rather bright redness, and considerably swollen, as if with serous effusion into their structures, and there was a dark, dirty, sloughy appearance on the left one. *Bel.* and *Rhus* were now ordered every hour alternately, and a wet compress applied outside over the tonsils.

In consultation, at 11.30 a.m., Dr. Drysdale diagnosed scarlatina maligna, and suggested *Acon.* instead of *Rhus*, to be alternated with the *Bel.*; these were given alternately every hour until evening. During the day she steadily grew worse; the pulse increased in frequency and feebleness. There were extreme prostration and torpor, so that she lay apparently unconscious, except when roused by the retching of the brown, slimy mucus. The tonsils enlarged rapidly, making considerable fulness at the angles of the jaw, and causing the head to be thrown up and backwards. Swallowing was very painful and difficult. In the evening of October 6th, that is, twenty-four hours after the beginning of the illness, as she was rapidly growing worse, *Rhus* and *Merc. biniod.* were substituted for the *Acon.* and *Bel.*, and alternated every hour. During the night she continued to grow worse in every way; was extremely restless and uneasy, moaning constantly and attempting to turn about, but was apparently too prostrate to do so, and dirty mucus trickled from her mouth. In the morning of October 7th all the symptoms were worse; the throat was nearly closed, and she breathed with difficulty, with an occasional interruption as though from the swollen condition of the fauces; the fauces and tonsils appeared softened, jelly-like, and as if gangrenous, and the head was thrown upwards and backwards as far as possible. There was retching when anything was given by the mouth, even a teaspoonful of cold water would provoke it, and the matter brought up consisted of mucus reddened with the blood apparently oozing from the mucous membrane or resulting from the gangrenous state of the fauces, with some blood in streaks as if forced out by the retching. After retching she always fell back on the pillow moaning, in a very weak and low voice, as though dying; she also sank down in the bed in a state of stupid lethargy like a dying typhus patient. The breathing was sighing, jerky, and intermittent, and there was loose, tickling, almost incessant cough, as though from trickling of the mucus into the larynx; the pulse could scarcely be felt; the rash was only faintly visible, and was

brown and rough. Appreciating now the hæmorrhagic character of the attack *Crotalus* was (in the morning of October 7th) given internally, in the 4th attenuation, a drop in a teaspoonful of water dropped slowly into the mouth every half hour. *Canth.* ϕ was also poured on the compress which was applied over the tonsils, in order to raise the cuticle, with the object of applying *Crotalus* to the denuded cutis. In the afternoon she appeared to be dying. The *Canth.* ϕ having raised the cuticle round the throat this was removed, and the wet compress was sprinkled over with *Crotalus*, 3rd trituration; this was renewed after an hour, and then every three hours.

There was no retching after the first application of the *Crotalus* to the denuded cutis; not even when beef-juice was administered, but the respiration and pulse remained much the same. In the evening as I sat by her bedside (for she was my daughter), expecting every moment to be her last, I noticed she gradually became less distressed; and during the night she dozed at intervals. Towards morning she really slept, and the breathing gradually became less laboured and less hurried and irregular; and on being roused for a dose of medicine she opened her eyes, and seeing me she exclaimed: "Oh! Pa," as though surprised at my presence. By 8 a.m., October 8th, the pulse had fallen to 120, and could be distinctly felt; the respiration was becoming easy; the head was less thrown up; and the struggle appeared to be turning in her favour. The rash was now freely out on the body and legs, it was, however, of a purple colour. At his visit abour 11.30 a.m., Dr. Drysdale was surprised at the alteration, and he gave a favourable prognosis. The same medicine was continued, now every two hours, and a simple water compress was kept to the throat. During the day of October 8th the rash gradually brightened in colour, and all the distressing symptoms receded rapidly, so that by evening she was able to drink with but little difficulty or pain; the respiration was almost normal, and the pulse was 100, and had gained some force and fulness. She slept well during the night, and the next day, that is, October 9th, her appetite began to return, and she looked wonderfully better; the change was really marvellous. From this date her recovery went on rapidly and steadily, the cuticle exfoliated rapidly, so that by the aid of vinegar baths and lard inunctions the skin was about natural on October 14th. She was attacked on the 5th, and nearly dead on the 7th under the treatment with *Bel. Rhus*, and *Merc. bin.*; *Crotalus* was administered in the morning of the 7th, it rallied her almost immediately, and she recovered so rapidly that a confident prognosis was given on the morning of the 8th.

Case 2.—J. D. H—, æt. 13, brother of the above, began to complain on the fifth day after his sister, that is, October 10th. His attack began in the morning, and was marked by much the same symptoms as in his sister's case. He had *Rhus* every hour and a wet compress outside over the tonsils. There was at once great weakness, much dizziness, trembling, and staggering to falling before evening, and there were headache and nausea. The fauces and tonsils were dark red, and during the day they became tumid, and swallowing became painful and difficult. Pulse 130, small and soft. He had a restless, feverish night,

with increase of all the symptoms, especially those of the throat; the prostration was extreme, and on blowing the nose it bled freely. The next morning, October 11th, that is, the morning of the second day of the illness, there was some brown miliary rash on the chest, and all the other symptoms were worse. *Crotalus* was now exhibited internally every hour, and *Canth.* ϕ was poured on the wet compress round the throat. There was much hæmorrhage from the nose during the day, and reddish mucus hawked up from the fauces. In the evening he appeared much the same. The cuticle raised by the *Canth.* ϕ was removed, and *Crotalus* 3rd trit. sprinkled on the compress as in the former case, and *Crotalus* 4 was continued internally. The epistaxis returned twice during the night. The next morning, October 12th, the rash was out well and the throat symptoms were diminished. He improved during the day, and had some sleep during the night. Next morning it was evident he was to recover. He made a like rapid progress with his sister, and was soon in fair health again. In this case, as in the former, *Crotalus* arrested the blood-poisoning almost immediately, and turned the scales in favour of the patient within a few hours.

I am satisfied that the application of *Crotalus* to the denuded cutis had a considerable share in bringing about the recovery, and in such cases I am persuaded that it would be advisable, as suggested by Dr. Drysdale, to introduce the *Crotalus* subcutaneously in the second or first attenuation (vide Mode of Administration, p. 194)."

Morbilli.—In an epidemic in the early part of the summer of 1883, the present writer attended a family of nine children, all down at the same time with measles of a severe type, the eruption was confluent over the whole body, except the legs of three of them. In all, the eruption was of a very dark colour. Ophthalmic and nasal symptoms were very severe, throat and chest symptoms moderately so, and there was some delirium. The predominant character was intense fever, and copious, dark, confluent eruption, with considerable œdema of the face. Two of them were treated with aco. 1 followed by rhs. 1, three with aco. 1 followed by *Crt.* 6, and the other four with *Crt.* 6 alone throughout (though all had sul. 6 during the last week of treatment). In those treated without *Crt.* at all, the skin remained covered with dark mottlings and raised papules after all the other morbid symptoms had disappeared and the patients were going about, so that in the fourth week *Crt.* was given to them also for a week; they were the last to exhibit a natural appearance of skin and a freedom from cough. In those treated with *Crt.* during the dark colour of the eruption, the mottling and papular condition of the skin showed a tendency to linger. Those treated with *Crt.* alone made the best, most rapid, and most complete recovery; in them the mottling and papular condition did not linger, and they were the first to exhibit a natural appearance of the skin and bronchial membrane.

Writing on serpent-venoms, DR. HUGHES says:—"Our information regarding its (lachesis) employment in yellow fever comes from DRS. HOLCOMBE and NEIDHARD. The former at first used lach. in alternation with ars., so that his experience was of doubtful value.

But in a second epidemic, having come to the just conclusion that the serpent-poisons were the most truly homœopathic remedies for the disease which we possess, he gave them in every case, choosing Crotalus in preference to lachesis when blood-poisoning was prominent. On both occasions he got excellent results. DR. NEIDHARD, in an epidemic occurring in Philadelphia in 1853, was led to rely more and more exclusively on Crotalus in its treatment. He found the attenuations from the third downwards far superior to the higher. In 1858 some more cases occurred, and again Crotalus served him well. He was thus led to give it in cognate forms of disease (as he considers them), the '*bilious remittents*' of his neighbourhood, which often assume a malignant form, and then closely resemble the true '*typhus icterodes*.' Here also he found the remedy of signal value."—*Pharmacod.*, p. 604. In his essay on yellow fever DR. NEIDHARD gives many cases of fever cured with Crotalus, No. 2, p. 37; besides fever there were giddiness, pains all over, and tenderness of the liver. "*Crt.* 3, in water, repeated from one to two hours, diminished the virulence of the symptoms from day to day, and entirely cured her in the space of a week." No. 3, p. 38, in addition to the fever there were darting, burning pains in the head, bewilderment of the brain, and pain about the liver; "*Crt.* 3 after aggravating all the symptoms for a day, cured her on the fifth day." No. 4, p. 38, in addition to the fever there were "swelling of the parotid glands, epistaxis, nose and cheeks red, face dark-coloured, and hands almost black; tongue dry in centre, point red and dry; attacks of light-headedness, sensation as if falling over a precipice, and blisters on top of nose. Cured by *Crt.* 2 in a few days." No. 5, p. 39, in addition to the fever, "the face was yellow, and there was constant inclination to void urine, which was dark brown, almost black. *Crt.* 3 very quickly relieved all the symptoms." v. also ib., pp. 49—60. On pp. 83—86 he gives the following cases:

"(1) MISS M. S—, æt. 22, was afflicted in the summer of 1876 with a *Bilious Remittent* fever, which was cured in a few days by the administration of *Crotalus Horridus* 3 in water, a teaspoonful every two hours. She received no other remedy, Crotalus acted like a charm. The symptoms, as I noted them down at the time, were the following: Chilliness alternately with heat, occasionally sudden cold perspiration, pulse full and 100 in a minute; the eyes were sunk, with a dark brown ring surrounding them; tongue dry in the centre and yellow, the point red; constant vain efforts to evacuate the bowels, nausea, and sick stomach; the passages are only slight, of a black colour, and pappy consistence; soreness in chest and stomach, pain on touching them; she cannot lie on the left side; great drowsiness all the time and excessive weakness."

"(2) MRS. O—, æt. 71. Has two paroxysms of fever every day, with the pulse 120. (The administration of Crotalus brings the pulse down to 100 on the first day.) The disease had lasted six weeks, and although various remedies were resorted to Crotalus horridus 3 in water always had the best effect. The following symptoms were the most prominent: skin dry, afterwards cold perspiration; very thirsty; takes a little water at a time; burning heat on top of the head; heat

in both cheeks, with redness; light-headed; eyes sunk; tongue coated yellow and dry; bitter taste in mouth; soreness and dryness of throat, which presents a dark red appearance; hawking up of greenish-yellow phlegm, with sweetish taste; sick stomach after eating, with vomiting and purging; slight pain in the region of the liver; dark brown diarrhœa; wakefulness. This disease was entirely cured by Crotalus horridus aided by baptisia tinctoria. After having the disease so severely it returned a year afterwards in a milder form, and was cured by the same remedy. The symptoms were very similar, with the exception of a cough, which was cured by laurocerasus."

"(3) A homœopathic physician in the country reported to me the following case of bilious vomiting, which was entirely cured by Crotalus in the 5th dilution. The case was of thirteen weeks' standing, and had been given up by the old school. Symptoms: *she could not lie on the right side or back without instantly producing dark green vomiting;* soreness in the back part of the head on pressure, worse on motion or sitting up in bed; drawing in the right side of the head, worse after eating, and producing great dizziness in the back part of the head. She sleeps only in the middle of the night, after which she feels better. She feels sick if she sleeps in the daytime. Light hurts the eyes, and everything looks yellow (at first everything looked blue to her). Aching in the liver; great heaviness in the stomach, with vomiting of everything she eats in the morning. She can eat better in the afternoon, and she feels sometimes as if she could eat fat pork. A continual acid taste on the tongue; inclined to be constipated; menses too early and too sparse; they are dark at first; roaring in the ears; great numbness of arms and legs, with coldness at times; skin very dark brown. After the first dose of Crotalus 5 she vomited but once, and was able to be out of bed in one week."

"(4) Mrs. M. S—, æt. 69, was cured in a few days by Crotalus 3 of a severe bilious fever with the following symptoms:—Chills in feet and hands, followed by heat in the head, which ached before; mouth dry; very thirsty; foul breath; heat and redness in the right cheek; on closing eyes wandering of mind; yellowish colour of the face; sensation of excoriation of the stomach, with soreness of touch; complete want of appetite; eructations of wind; *gnawing aching pain* in the liver; sanguinolent discharges from the bowels. In addition to the above she was also afflicted with hepatisation of the right lung, and consequent shortness of breath, always expectorating much yellow phlegm after severe hard cough, and soreness on the left side. The effect of the Crotalus was assisted by the exhibition of baptisia tinctoria. The cough was cured by cod-liver oil."

"(5) Lieutenant W—, of Commodore Wilkes's expedition, consulted me quite lately in his case of yellow fever, which he had contracted on the coast of Cuba. Although much diminished in violence it never ceased entirely notwithstanding numerous powerful remedies had been exhibited for six weeks, until he took the Crotalus horridus 3 in water. In two days, after a slight aggravation, the fever was arrested. He considered this effect so remarkable that he mentioned it to everybody. In order to break the fever he had received

quinine in thirty-grain doses repeatedly, also calomel; finally, nitro-muriatic acid, but without avail. He did not improve until he reached a colder latitude, and his fever was not arrested until he took the Crotalus."

"(6) Miss V—. Headache with high fever, mostly at night, with great drowsiness; aching in all the bones; heat in forehead; the slightest motion hurts the head; burning in the chest. Crotalus horridus 2 cured, after aconite and belladonna had been administered in vain."

"(7) Mr. M— went with the volunteers into Maryland, and was encamped on a small stream. Returning soon after he was attacked with a bilious fever with the following symptoms:—Bilious vomiting, with violent fever and delirium; entire forgetfulness of everything; dulness of the head, with great apathy and forgetfulness; everything tastes bitter, and sometimes acid; finally, very fœtid diarrhœa; tongue dark brown; constant drowsiness; dryness of the skin (for these last three symptoms Crotalus is particularly indicated); urine high coloured. When the crisis took place after Crotalus there was a warm perspiration. Two days after commencing the Crotalus the brown colour from the tongue gradually disappeared, and he had several green watery passages, always a very favorable symptom for the speedy cure of these fevers."

"(8) Mr. A. M—. Chilliness every afternoon; a kind of crawling up and down the back, and afterwards all over, for five or six hours; severe pressure on the top of the head, running to the ears, with light-headedness and confusion, and heat from the head to the feet; shooting pain from the occiput down the spine and arms; foul breath; tongue coated yellow; bitter taste in the mouth, and nausea; soreness to the right side of the pit of the stomach through to the shoulders; aching in the middle of the chest to the back; dull pain across the hips, and also in the back and left shoulder; constant inclination to stool, with dark brown-blackish discharges. Crotalus 3 at once cured all these symptoms."

(9) Dr. W. Jackson Simon, of Philadelphia, reported to me the following case of a cure of bilious fever with Crotalus, which I will give in his own words:

"Having lost my notes taken during the illness of Mr. Wm. W—, I will have to depend on my memory for a statement of his case. October 5th, 1860.—Was this day requested to visit Mr. Wm. W—, æt. 28. Constitution remarkably good. Had never been sick until two months previous, at which time he was in the West and had fever and ague. Temperament bilious, sanguine. I found him complaining of severe frontal headache, and alternate chills and heat; tongue furred white, the tip and edges scarlet red; pulse full and strong, about 140 per minute. Complained of some soreness of the abdomen on pressure, but none when that was removed. I prescribed aconite and rhus tox. for some time, but without any improvement. Other remedies were given as the symptoms indicated, but all failed to relieve him. On the twenty-first day of my attendance, finding the patient much worse, I called Dr. J. G. Howard in consultation. We used a number of remedies, but without any apparent benefit. His condition at this time re-

was as follows: Tongue dry and cracked, dark-brown streak down the centre, the edges of a deep red colour; occasional bilious discharges, no appetite, a cold clammy perspiration on the forehead and temples, skin yellow; would speak when roused by shaking, seemed entirely unconscious of everything. Urine of a dark red colour, depositing a dark yellowish-red sediment; pulse 50, weak. As his mother was a widow and he her only son, I felt extremely anxious to save his life. While on a visit to Mr. Radde's store to purchase medicines, a new work was handed to me, *On Crotalus in Fevers*, by DR. NEIDHARD. In glancing over it I saw several cases given, corresponding in symptoms to MR. W—'s case, in which the author had used Crotalus with great success. I asked Mr. Radde if he had any that was reliable. He said no, but thought he could get some from a physician just from Havana. I waited about two hours, when he returned with a drachm vial of the third trituration. I immediately returned to my patient, and informed his mother that I had something which I hoped would relieve him; if it did not I could do nothing more. I left five powders, containing one grain each, directing one to be given every three hours until all were taken. On my visit the next morning I found my patient conscious, and wanting something to eat. The medicine was continued every six hours for three or four days, when, the patient being able to sit up, it was discontinued. In ten days he was able to attend to his business."

DR. S. LILIENTHAL speaks highly of Crotalus as well as lachesis and apis in the treatment of "spotted fever," as well as yellow fever.—*North Amer. Journ. Hom.*, xvi, 503.

DR. WALLACE says:—"The delirium of typhus (typho-mania) is almost immediately relieved by it, and a serene mind, expressive of pleasure, follows."—WALLACE, A 11, l. 24, p. 200.

DR. BRYCE of Edinburgh, sends the following case of pyæmia:—"MISS B—, æt. 48. January 23rd, 1883.—States that two months ago she bruised the *first* joint of the middle finger of *right* hand, on palmar surface, with the handle of a pair of pincers used in the ordinary way. There was no abrasion of the skin, but the joint became red and blue, and then swollen, increasing finally to about twice its natural thickness. She bruised it again several times subsequently, and after each time the discolouration returned and the swelling increased. There was little pain but great tenderness on even slight pressure. She applied arnica lotion, 1 to 20, and took arn. 2^x internally. At the end of three weeks the *second* joint was swollen, painful, and tender to touch. After ten days more the sides of these two joints projected so much that the case was pronounced to be rheumatic arthritis. Now, for the first time seen by me, I found the right middle finger swollen, hard, tense, and of a glossy, blue-gray colour, and quite rigid, incapable of any movement. The ring finger is also in a somewhat similar state but to a less degree, and the other fingers as well as the thumb are affected, but to a still less extent. There is a blush of redness on the back of the hand, with pain extending to the elbow. There is complete want of appetite, and she feels low and weak—'miserable,' she says. Ordered hyperic. lotion and hyp. 3^x internally. February 22nd.—She did not call again until to-day, when she reports that the fingers and hand had gradually

grown worse. There is now angioleucitis of palm, three red lines, and an abscess in right axilla discharging; she says it began to form twelve days ago and burst four days since. There is also an abscess forming in *left* axilla. Thinking now that there must be some blood-poisoning I inquired if there had been an abscess on the injured finger. Her answer was that on the first occasion on which she consulted a doctor about it, three weeks after the first bruise, he said there was an abscess forming, but on her next visit he said the signs of abscess had disappeared. She states that no abscess had opened. Ordered *Crt.* 6 five drops, four times a day. March 2nd.—Hand is somewhat better, the swelling, hardness, and stiffness of fingers are less. I opened the abscess in *left* axilla and let out the pus. Continue *Crt.* 6. March 8th.—Her sister called to tell me that the wound in left axilla was almost healed, but that there is redness and great tenderness on inside of *left* elbow, as if an abscess were forming there. The part is very tender to touch, and when touched a pain extends down to the wrist, but no apparent discolouration at the wrist. She also states that in the hollow of the left foot there is a lump about the size of the end of a little finger, very tender to touch and rather red. Ordered *Crt.* 3 instead of 6. March 26th.—The discolouration, hardness, swelling, and tenderness have all disappeared from the fingers, but they are still stiff though they can be flexed slightly. The right arm is altogether much thinner than the left. Left elbow is much better, the threatened abscess evidently aborted. No appearance of any more abscesses anywhere. To go back to *Crt.* 6. April 4th.—Right hand and fingers quite natural, except that the fingers are a little stiff. Left elbow and arm rather worse, and has, she says, a tight cord-like feeling extending from front of elbow down front of forearm, with 'round spots' of pain here and there along front of forearm. The 'spots' of pain remain only for a few minutes and then pass away, but recur frequently during both day and night, more frequently in the day. She cannot grasp with left forefinger and thumb, and cannot extend left arm without pain. The lump is still present on plantar aspect of foot and is still rather tender. Of herself she now feels well, and the 'insensible' feeling has disappeared, but from the first to the middle of last month she had felt in a peculiarly nervous state. Her appetite is now as good as usual, she sleeps well, and is able for a long walk for the first time this year. To go back to *Crt.* 3. April 19th.—Left arm is nearly well, feels nothing but a slight tightness along front on extending it. Fingers of right hand are natural in appearance but deficient in power; right arm feels natural and is rapidly regaining power. The lump in sole of foot still there, but gives no trouble. No more 'spots of pain.' Continue *Crt.* 3 for some time."

The more familiar and very similarly-acting serpent venom, lachesis, also has great reputation in the treatment of fever, especially septic and zymotic. v. [illegible] 54, 55. "We have seen," says Dr. HUGHES, "how [illegible] the similarity between the phenomena of snake (Crotalus) [illegible] form, and those of the invasion of [illegible] Dr. P. P. W.

[illegible] p. 162, present essay].

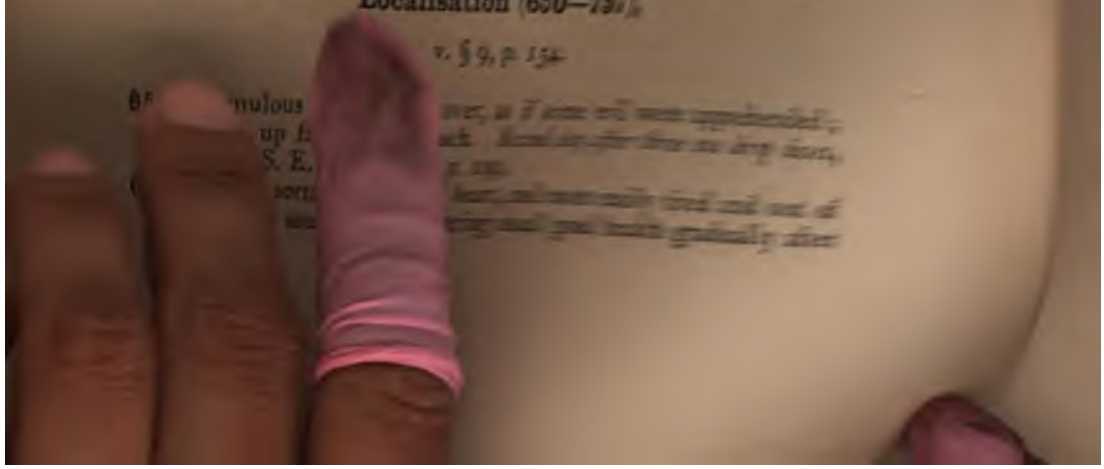
[illegible] a homœopathic point of view [illegible]

Re [illegible] another stage of scariatina?

play. It is when the throat symptoms assume a virulent character, and therewith signs of blood-poisoning and prostration show themselves. I am reminded as I speak of a case of this kind where lachesis rapidly removed the patient from the sphere of gravest foreboding into that of happy convalescence." *Pharmacod.*, p. 606. "With regard to lachesis, I may mention that DR. JOUSSET esteems it the principal remedy in malignant scarlatina; 'it has procured us,' he says, 'unhoped for successes.'" *Therapeutics*, i, p. 63. After running over the symptoms of pyæmia, DR. HUGHES says: "I have put down these details that you may estimate the warrant I have for saying that lachesis is the most promising remedy we have for this condition. The phenomena, local and general, which follow the serpent's bite, lead us to expect that when a local affection assumes a malignant character, and from thence proceed poisoning of the blood and prostration of the nervous energies, there lachesis will be homœopathic and curative. Now this is just what we have in pyæmia. I have already spoken of the proved value of the remedy in malignant pustule; and shall have to tell you of its power of arresting gangrene. These are just the kind of local affections which induce septicæmia." *Therapeutics*, i, p. 253. DR. C. DUNHAM gives a bad case of measles: "April 5th, 1860, JOSEPHINE BERMINGHAM, aged nine years, well grown, had, last winter, scarlatina very severely. It left her delicate and deaf. Nine days ago she was exposed to the measles. The rash appeared on the 6th instant, along with a copious discharge from the ears. Yesterday (8th) this discharge suddenly ceased, and the rash disappeared. She immediately became very feeble and prostrate; was seized with wild muttering delirium. She had great thirst, drinking, however, but little at a time. There was a singularly biting heat of the skin. I saw her first at eleven a.m. on the 9th inst. She had lain in alternate delirium and stupor for twenty-four hours; was irrational; had low muttering delirium; the pulse was soft, weak, hardly to be counted; there was calor mordax; the respiration was attended by moaning; it was very rapid, whistling; there was an occasional single cough, with a moan following each cough, and a grasping at the throat, as if to tear away the clothing from it. The pupils were widely dilated; there had been no stool for two days; the urine was scanty and seldom passed; I could not secure any for analysis. The expression of the countenance was cadaverous; the odour of the breath putrescent. I ordered lachesis 30, six globules in water, a teaspoonful every two hours. Also strong beef tea every two hours. At six p.m. I found her sitting supported in an arm-chair playing with some toys; rational; the skin of a pleasant temperature; the pulse eighty, regular and soft. The attendants reported that after the second dose she had slept quietly, had had no more delirium and no thirst. I found the eyes normal, the cough infrequent and not painful. I ordered saccharum lactis. The rash did not re-appear. The patient convalesced from this point, and I gave no other remedy and did not repeat the lachesis. This change from apparent impending death to established convalescence within the space of seven hours was very impressive and even startling." *Mat. Med.*, ii, 248. And after relating quite a list of remarkable and indisputable cures cured with lachesis he goes on to say: "This statement would at once suggest its usefulness in typhoid (typhus-like? J. W. H.) fevers; and those who have made themselves familiar with lachesis have learned from clinical experience to place great dependence upon it in treating certain forms of these diseases. *Ibid.*, p. 255.

§ 23. Generalities or Symptoms incapable of Specific Localisation (650—757).

v. § 9, p. 154.



some days. *After three days' proving of 3rd dil. in frequent doses.*—HAYWARD, **A** 3, l. 51, p. 197.

652. Drowsy and heavy in evening; turning about very much in bed; is easily tired by slight exertion, arms feel benumbed in morning; the legs go to sleep and tingle when sitting; lips and throat dry, with thirst. *Twelve days after pilule 4th dil., being fifth dose of the drug within nine days.*—S. E. S., **A** 7, l. 27, p. 199.

653. In the morning on awaking feels as if beaten; can hardly muster up courage to rise.—LINGEN, C. H., 2828, **A** 1, p. 195.

654. In the morning on awaking, a bruised pain in all the bones, which passed away after rising.—SCHMÖLE, C. H. 2455, **A** 1, p. 195.

656. Dr. G. F. Collier says: The bite of a rattlesnake produces dropsy.—*Boston Medical and Surgical Journal*, vol. xxii, p. 443.

657. General dropsy; lasting a long time. *After pure venom in pills.*—WALLACE, **A** 11, l. 13, p. 200.

657a. Visible trembling all over, for five minutes. *Shortly after four drops of pure venom in water.*—KITTEN. HAYWARD, **A** 12, l. 4, 201.

658. Extensive muscular twitching. Can be roused with difficulty; respiration hurried; convulsive movements of fore-legs and neck. Can still stagger a few paces; but co-ordination of muscular power much diminished; followed, after twenty minutes more, by violent convulsions, and after fifteen minutes more by general paralysis; and death followed after ten minutes more. *One hour and twenty minutes after ¼ gr. dried venom dissolved and injected into peritoneum.*—GUINEA-PIG, **B** 10, l. 16, p. 208, also **B** 11, p. 209.

659. Restlessness and muscular twitching of body generally soon commenced; then passed away, but the animal became sluggish and remained so all night, and died at nine next morning. *After injection into thigh of ¼ gr. dissolved dried venom.*—GUINEA-PIG, **B** 12, l. 4, p. 209.

660. Violent convulsions, with opisthotonos, followed by death within two minutes. *One minute after ¼ gr. dissolved dried venom injected into jugular.*—RABBIT, **B** 14, l. 4, p. 210.

661. Immediately respirations were quickened; then twitching of muscles generally, then efforts to vomit; then forcible extension of limbs, then rolls over; ataxy, staggers when walking; peculiar twitching of diaphragm, not synchronous with respiration; remains on side. *Forty minutes after ¼ gr., dissolved dried venom into jugular.*—CAT, **B** 15, l. 4, p. 210.

662. Trembled all over, breathed very rapidly and refused to walk, even when urged to do so; became quiet and stupid, and lay down on her belly; and, on being roused, moved sideways, and mewed distressingly. *A few min. after five drops 1ˣ injected under skin.*—KITTEN, **B** 3, l. 23, p. 207.

663. Twitchings of the muscles, especially about head and neck. *After application of venom to peritoneum or injected under skin.* **B** 10, l. 4, p. 208, **B** 11, l. 3, p. 209, **B** 12, l. 4, p. 209, **B** 13, l. 3, p. 209, **B** 15, l. 4, p. 210.

664. Pains over whole body, extorting frequent groans. *Five and a half hours after bite on hand.*—MACH., **C** 29, l. 52, p. 230.

665. Repeated faintings; tremblings and convulsions of limbs, with rush of blood to head. *After a bite.*—SPIX, C 31, l. 3, p. 233.

666. Great prostration; convulsive movements of lower jaw and lower extremities; urine bloody. *Twenty-one hours after bite on hand.*—MACH., C 29, l. 92, p. 230.

667. Rapid loss of strength, so that he could not make any exertion whatever. *Immediately after bite.*—ESSEN, C 10, l. 16, p. 217.

668. So weak he could not sit up. *Within an hour after bite on hand.*—STADIA, C 30*b*, l. 6, p. 233.

669. His strength was so much reduced that it was three or four weeks before he felt himself again. *After bite on palm.*—SHIPMAN, C 8, l. 36, p. 216.

700. Still a tendency to sinking; and the system appeared to have to struggle with the poison. *Second and third days after bite on finger.*—STEEL, C 22, l. 28, p. 222.

701. Great exhaustion and debility. *Thirty-six hours after bite on leg.*—BOY, C 9, l. 6, p. 216.

702. Muscular prostration. *Five and a half hours after bite on hand.*—MACH., C 29, l. 50, p. 229.

703. Countenance deathly pale; eyes half open and staring; mouth covered with foam; extremities cold and insensible; pulse irregular, trembling and scarcely perceptible; respiration slow and laborious. The body perfectly motionless, and covered with cold viscous sweat; and eyes and ears insensible to impressions; as if the child were expiring. After three or four minutes more the face was slightly convulsed; and after a few deep, stertorous respirations the child died. *After bite on cheek.*—CHILD, C 27, l. 4—12, p. 226.

704. Sudden paleness of face, and on attempting to sit down he fell over. There was relaxation of the muscles, and total loss of movement and power; his head hung upon his chest; there was stertorous breathing, syncope, and involuntary evacuation of urine and fæces; with cold extremities. *Twenty-five minutes after two bites on hand.*—DRAKE, C 28, l. 10, p. 226.

705. Pulse almost imperceptible and threadlike; extremities cold; cramps in legs; great debility; eyes muddy and heavy; face somewhat bloated; depressed, restless and uneasy. *Eighteen hours after bite on arm.*—LAKE, C 26, ll. 11—14, p. 225.

706. Almost moribund; pulse wavy and scarcely perceptible; the surface cold and bathed in perspiration; face swollen, with a besotted expression; mind wandering; pupils dilated, and she could not see, declaring it was dark and that candles were burning in the room; asked frequently if it were not raining, although the evening was calm and clear. *Two and a half hours after bite on instep.*—MISS R—, C 5, l. 4, p. 213.

707. Extended, motionless and speechless, and jaws locked; with a very feeble, fluttering, and scarcely-perceptible pulse. (Was roused out of this state by brandy.) *Shortly after bite.*—ESSEN, C 10, l. 4, p. 217.

708. Along with headache, red tearful eyes, and dryness of mouth and throat, with thirst, there was much œdematous swelling of whole

body, head, and face, also followed by burning pains in trunk and great sensibility to touch of whole surface. *After an hour after bite on toe.*—WOMAN, C 13, l. 12, p. 218.

709. Some dropping of blood from nose (continuing and increasing for six hours), with quick pulse and increased anguish and inquietude; followed in a few minutes by involuntary groans and sensation of sinking, and great restlessness, which lasts fourteen hours (v. ll. 76, 83), and is increased by drinking water. Great pain in arms and general swelling of body. *Three hours after bite on hand.*—MACH., C 29, ll. 36—40, 56, 64, ll. 229, 230.

710. Burning pains in trunk, lasting several days, with great sensibility, increased by touch. *Ten hours after bite on toe.*—WOMAN, C 13, l. 14, p. 218.

711. Violent burning pain in trunk, especially lower part, increased by touch. *Fifteen minutes after bite on foot.*—WOMAN, C 12, l. 4, p. 217.

712. Pain in bitten limb, and all over body; with coldness of extremities and prostration; with loss of pulse and inability to walk. *Within twenty minutes after bite on heel.*—FRANCISCO, C 6, l. 16, p. 214.

713. Numbness over whole body; followed in a few minutes by tremor of whole frame and sensibility to touch. *One hour and a quarter to one hour and a half after bite on hand.*—MACH., C 29, l. 25, p. 229.

714. Painful swelling, gradually extending from bitten part for three days. BELCHER, C 24, ll. 3, 11, 16, 19, p. 223.

715. The swelling spread over whole body: and not until some days had it begun to decrease, leaving marble-like, green, yellow, and bluish spots. *Fifteen minutes after bite on foot.*—WOMAN, C 12, l. 7, p. 217.

716. Swelling, gradually and rapidly extending to the surrounding parts; hard, and terminating abruptly. The part was of a dark greenish-yellow colour. The discolouration did not extend as far as the swelling, but seemed to follow it at half an hour's interval. *After bite.*—WAINWRIGHT, C 30, l. 16, p. 231.

717. Whole body considerably swollen, especially bitten limb, eyes being almost closed with the swelling of face. Tongue tumid; deglutition difficult; and articulation indistinct. *Twenty-six hours after two bites on foot.*—BIGGS, C 2, l. 3, p. 212.

718. On the third day reaction appeared to be more established: but suppuration supervened, and kept him in bed for nearly the week. STEEL, C 22, l. 22, p. 221.

719. Suppuration—abscess at distance from bitten part. *Five days after bite.*—BELCHER, C 24, l. 20, p. 223.

720. Surface of body cold. *Twenty-six hours after two bites on foot.*—*Patient recovered.*—BIGGS, C 2, l. 13, p. 212.

721. Extreme tolerance of alcohol. *After a bite.*—MISS R—, C 5, l. 30, p. 213.

722. The bitch suddenly staggered and fell on her side, then rose and again fell. The pulse, which before the poisoning was 154, rose immediately after the bite to 175. When she fell it was about 160,

irregular, and feeble. After this its force diminished gradually, but the rhythm changed very little until just before death (eighty minutes after bite), when it fell rapidly. An hour after the bite the animal still lay on her side, making efforts to vomit. Upon lifting her up she succeeded in vomiting a little mucus; and passed a loose stool; and soon after lying down again urinated freely. *Half an hour after two bites.*—Dog, **Ca** 9, l. 8, p. 241.

723. He at once lay down, then rose and passed urine and solid fæces, and, at the fifth minute, fell on his side and vomited freely. The vomiting was instantly followed by general convulsions, in which the limbs were extended and the head thrown back. Meanwhile the heart was very feeble; the breathing laborious; and the pupils contracted. The character of the respiration was singular: eight or ten rapid respirations took place, and then none occurred until twenty seconds had elapsed. The heart-beat, previously 180 to the minute, fell at the fifteen minute to 80, and became remarkably feeble. At the seventeenth minute the respiration stopped; and the heart-pulse, though so weak as to be counted with difficulty, rose to 156; falling again, at the twenty-fourth minute, to 58, when it became indistinct through weakness. *After a second bite on the neck.*—Dog, **Ca** 7, ll. 5—17, p. 240.

724. During first half hour the bitch stood on her feet, her head hanging a little, and blood running freely from the wound. At the end of the half hour she suddenly staggered and fell on her side, then rose and again fell. At the end of an hour she still lay on her side making efforts to vomit. After being lifted up she lay down again; and died convulsed at the eightieth minute. *After two bites.*—Dog, **Ca** 9, ll. 5, 12, 17, p. 241.

725. Within ten minutes the animal became feeble and reeled about as if giddy. At length he lay down on his side, breathing heavily. The muscles about the flank wound twitched a good deal at first, and the general fremitus was well marked within thirty minutes. After lying thus for five hours he died quietly. *After two bites.*—Dog, **Ca** 10, l. 4, p. 242.

726. Within ten minutes he vomited, urinated, and passed solid fæces. All this time he whined a good deal; and finally, at the fifteenth minute, lay down on his side, breathing in jerks, and twitching in every muscle. *After bite on shoulder.*—Dog, **Ca** 5, l. 1, p. 238.

727. The head was suddenly thrown back; the pupils were contracted, and the limbs were extended, though not violently. She then drew a long breath and expired. *Eighty minutes after two bites.*—Dog, **Ca** 9, l. 18, p. 241.

728. Slight convulsion and vomiting. *One hour after bite on shoulder.*—Dog, **Ca** 5, l. 5, p. 238.

729. Prostration, vomiting, and general convulsions, in which limbs were extended and head drawn back. *Five minutes after a second bite on neck.*—Dog, **Ca** 7, l. 7, p. 240.

730. Sudden and immediate prostration, so that at fifth minute he fell over on his side, vomited, and went into general convulsions. *After a second bite on neck.*—Dog, **Ca** 7, l. 7, p. 240.

731. The fremitus, at first localised in some of the bites, soon became general, until it disappeared before the profound debility which seemed to affect the entire economy. Death in three hours. *After bites in several places.*—Dog, **Ca** 8, l. 4, p. 241.

732. Trembling in every muscle. *Within five minutes after bite.*—Dog, **Ca** 7, l. 3, p. 240.

733. Some evidence of general feebleness, which passed off after five hours, with slight ineffectual efforts to vomit. *Half hour after bite on shoulder and leg.*—Dog, **Ca** 3, l. 4, p. 238.

734. The animal became a perfect skeleton, and only commenced to mend after three weeks. *After a bite.*—Horse, **Ca** 23, l. 13, p. 221.

735. Reduced in flesh and thrown out of condition, and unfit for work for a week. *After a bite.*—Horse, **Ca** 22, l. 11, p. 244.

736. A few minutes after the bite the animal was seized with weakness, gritting of the teeth, and rapid respiration. It passed urine and fæces, and remained feeble during some hours. After this the weakness abated somewhat, but the back continued to swell. On the second day the local signs were improving, but the animal had passed some very albuminous urine and a large amount of blood mixed with the fæces. The symptoms of general weakness now increased, and the hind legs began to drag; the movements were uncertain, and the bloody purging grew worse. It died on the third day. *After bite on back.*—Rabbit, **Ca** 26, p. 245.

737. It rolled over, gasping and slightly convulsed, and was dead in one minute. *After bite on paw.*—Rabbit, **Ca** 25, p. 245.

738. Sudden prostration, and death in twenty-seven minutes, with violent convulsions. *After bite on neck.*—Rabbit, **Ca** 30, l. 2, p. 246.

739. Sudden loss of motor power; respiration quick and laboured, but not jerking. Death in twelve minutes, with slight convulsive movements of limbs and the skin muscles. *After bite on neck and head.*—Rabbit, **Ca** 33, p. 247.

740. The symptoms of general weakness increased on the second day, and the hind legs began to drag; the movements were uncertain, and the bloody purging grew worse. It died on the third day. *After bite on back.*—Rabbit, **Ca** 26, l. 7, p. 245.

741. Passed urine and fæces, and remained feeble during some hours. *After bite on back.*—Rabbit, **Ca** 26, l. 3, p. 245.

742. It walked across the table, and, seeking a corner, remained at rest until, at the close of three minutes, it fell down and immediately began to breathe convulsively, now and then gasping and making efforts to rise. It became more and more feeble, and the breathing more laboured, until it died at the end of the seventh minute. *After a bite on back.*—Pigeon, **Ca** 15, ll. 1, 6, p. 243.

743. Much enfeebled and disposed to sleep, and sank lower and lower until its head touched the table, when it rolled over on to its side; where it lay until it died, at the eleventh hour. *After bite by an exhausted snake.*—Pigeon, **Ca** 19, p. 244.

744. The bird showed signs of weakness, staggered to and fro, and

sought refuge in a corner. *Two minutes after being bitten by two snakes.*—PIGEON, Ca 16, l. 1, p. 243.

745. The bird becoming weaker and weaker gradually sank down, and died at the end of five hours and a half. *After bite.*—PIGEON, Ca 21, l. 5, p. 244.

746. Within five days the skin gave way, and the parts beneath sloughed to the bones: on the close of this process, on the sixth day, the bird died; "probably," says Dr. Mitchell, "of mere exhaustion and constitutional irritation." *After bite on breast, in which nearly all the venom was lost.*—PIGEON, Ca 18, l. 5, p. 244.

747. Death immediately, *i.e.* within thirty seconds. *After bite.*—PIGEON, Ca 17, p. 244.

748. At once appeared very uneasy, and for ten or twelve minutes leaped about incessantly. At the close of half an hour it became suddenly quiet, and shortly afterwards was attacked with general quivering of the muscles, followed by the loss of volitional control. *After bite on spine.*—FROG, Ca 37, p. 247.

749. Motionless, except under excessive stimulation, and if placed on its back turned itself over with great difficulty. *Third day after bite on back of pelvis.*—FROG, Ca 38, l. 6, p. 247.

750. Prostration and loss of power, without loss of sensation or cerebration.—RABBITS, MITCHELL, p. 68.

751. Gradual loss of power, with continued ability to hear, see, &c., until death.—RABBITS, MITCHELL, p. 68.

752. Sudden loss of motor power; gaping; prostration; very quick respiration.—RABBITS, MITCHELL, p. 68.

753. Sudden prostration.—RABBITS, MITCHELL, p. 68.

754. Prostration; gradual loss of motion.—RABBITS, MITCHELL, p. 68.

755. Symptoms of weakness suddenly developed fifteen minutes after bite.—RABBITS, MITCHELL, p. 68.

756. General twitching.—RABBITS, MITCHELL, p. 68.

757. Death after forty-eight hours as if from putrescence, and within a few hours afterwards the corpse became livid and much swollen. Ten and a half hours after death the body was enormously swollen, and covered with red and livid spots, and exhaled such an insufferable fœtor as to preclude the possibility of an autopsy.—MACH., C 29, l. 100, p. 231.

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Pathogenetic Commentary.

To this section are relegated not so much the symptoms which seem to indicate the "general" action of the drug as those that appear anomalous, unconnected, or not belonging to any of the preceding sections. Still, even here the symptoms indicate that oppression of the brain and nervous system, depression of the heart and blood circulation, degradation of the blood and sapping of the vitality which are characteristic of the onset, course and termination of malignant forms of the septic and zymotic diseases, and other toxæmiæ, such as albuminuria, jaundice, leucocythemia, pernicious anæmia; and many of them are in this respect very indicative. Bearing in mind, for instance, the state of the circulation and respiration—the sudden pallor, the rapid failure of strength, tremulous weakness, bruised feeling, faintings and staggerings, when taken together, are very indicative of the onset of malignant zymotic disease. And remembering the vomitings, purgings, and cramps—the cold surface, shrunken countenance, and choleraic state become very indicative of malignant cholera. And recollecting the anæmic condition, somnolency, and convulsions—the puffed face, general œdema, albuminous, smoky, and bloody urine, scanty and high coloured, and of high specific gravity, become very indicative of acute nephritis, such as follows scarlatina. Whilst, taken along with the restlessness, nervous agitation, unsteadiness of movement, and the tremulousness—the state of the eyes and countenance, jactitation, thirst sleeplessness, and delirium, the craving for stimulants, extreme

tolerance of alcohol, and the symptoms of intoxication, point very distinctly to acute alcoholism and delirium tremens. And calling to mind the frequent vertigo, loss of memory, mistakes in orthography, and the sudden falling—the epileptoid convulsions are very indicative. So with the sensibility of the surface, trembling, twitching, and the tetanoid convulsions. And so with the coma, stupor, faulty orthography, numbness, and the apoplectiform state. And so with the loss of co-ordination of movement, jactitation, staggering, and paraplegia. And so also with many other of the symptoms recorded in this section. Nor, along with the symptoms definitely mentioned here should we forget the general feeling of out of sorts and the loss of flesh; the staring coat (in animals) and falling off of the hair; the breaking out of pustules and boils; the occurrence of hæmorrhage, ecchymoses, and extravasations; nor the other signs of general degradation of the blood and vitality.

v. § 10, p. 155.

Therapeutic Application.

From the above indications we are prepared to look to Crotalus for considerable help in the treatment of the following affections, not referable to other sections; especially when connected with septic or zymotic disease, or other toxæmia, or with general degradation of vitality; viz.:

Epilepsy: although Crotalus may occasionally find place in the management of sympathetic, and even idiopathic, epilepsy when of an apoplectiform variety, its true place here is in the treatment of epileptic convulsions, when occurring at the onset of septic or zymotic disease; here it is, perhaps, the most truly homœopathic medicine we possess.

Chorea: especially when it it can be traced to anything septic or toxæmic; and even if autogenetic, as in rheumatic, gouty, albuminuric, or amenorrhœic subjects.

Tremblings and Twitchings: especially if resulting from alcoholism, or septic or zymotic disease.

Convulsions: especially if occurring at the onset of the exanthemata; also puerperal, and particularly if there be albuminuria, coma, blue-bloated countenance, with frothy, sanguinolent saliva, or tendency to hæmorrhage, v. "Head" 'Commentary.'

Hysteria: especially when very convulsive, or apoplectiform.

Neuralgia: especially when occurring as a sequela of septic or toxæmic or even miasmatic disease; or chronic bilious, climacteric or albuminuric conditions.

Local Spasms, Cramps, Trismus, &c.: especially where occurring as sequela of toxæmia; or in broken-down constitutions.

Hydrophobia.—As a neurosis resulting from the introduction into the blood of an animal poison, and as many of the symptoms are so analogous to those of Crotalus-poisoning, Crotalus should not be forgotten in the treatment of this disease.

Dropsy.—The pathogenetic action of Crotalus on the heart, kidneys, and liver gives it a place in the treatment of cardiac, renal, and hepatic dropsies; but besides this, by its degrading, defibrinating action on the blood; its relaxing, congesting, softening action on the blood-vessels and lymphatics; and its checking, perverting, arresting action on the general cell-nutrition of the body, it produces general œdema and scanty urine of high specific gravity, and has, therefore, a place in the treatment of general dropsy not necessarily dependent on organic disease of any of the great central organs, but rather an expression of a debilitated or softened state of the capillaries, or a general breakdown of the vital powers, and particularly if this has resulted from chronic alcoholism, or from septic or zymotic, or other depraving or debilitating disease. [Since writing the above I have met with an excellent article by Dr. T. L. Brunton in the *Practitioner*, vol. xxxi, entering minutely into the pathology of Dropsy, and fully bearing out the above remarks and indications for its treatment: v. p. 195, ll. 3, 15, p. 196, l. 33, and to end of paper; indeed the whole article is well worth careful perusal.]

Myxœdema.—Of this obscure disease—apparently a combination of anasarca and elephantiasis—a very illustrative case is narrated in the *Lancet*, 1883, vol. ii, p. 56, by Dr. Lane. The symptoms there enumerated make it evident that Crotalus would probably afford considerable help in its treatment, especially if at all traceable to septic, zymotic, or other toxæmia.

Apoplexy, *Convulsions*, *Neuralgiæ*, and *Tremblings and Twitchings.* v. "Head."

Hæmorrhage. v. "Circulatory Organs."

Jaundice. v. "Abdomen."

Paralysis. v. "Back."

Clinical Experience.

Clinical experience with Crotalus in the treatment of the above affections is yet only limited. The present writer has witnessed much benefit from its use in many of them, especially when dependent on heart disease or blood degradation. The following case, amongst others, occurred in his practice. *Dropsy.*—Mrs. H—, aged 26, of rather strumous constitution, confined of her third child, January 22nd, 1883. Had a fair time, but did not recover well afterwards. The lochia stopped suddenly on the ninth day; this was followed by pain in right ovarian region and in the course of the veins in the thigh; the veins became much swollen, and she had to remain in bed for four weeks. The swelling and pain gradually lessened, but never disappeared entirely. She came under the writer's treatment on March 1st, 1883, after an aggravation of all the symptoms from moving about. The right thigh was then much swollen, the veins very hard and large, much tenderness in iliac region through to back, greatly aggravated by slight pressure; could scarcely stand or walk. Diagnosed pelvic abscess

forming: hep. 6, five times a day, with fomentation and poultices. After two weeks an abscess pointed and burst, and a large quantity of fœtid pus escaped in front of thigh. Under hep. 6, crt. 6, and sil. 6 the abscess healed up within two weeks, and she returned home—a distance of some fifty miles. On May 25th she reported, that for two weeks she had felt very debilitated; the urine had been very scanty, and the body had become much swollen, the legs especially, so that she could not put her boots on. *Crt.* 6 was sent, a drop to be taken five times a day. After a week she reported that on the day after beginning the medicine the urine became very copious; and the following day the swelling was so much reduced that she could put her boots on. She was quite well within a week, and had no return. Living at a distance the urine was not examined. DR. CHAPMAN writes: "I remember reading, in an old medical magazine, the case of a woman who was housekeeper to a gentleman who had a rattlesnake in a jar in spirits of wine. The woman was dropsical; and her recovery was despaired of. On one occasion she drank some of the spirits of wine in which the Rattlesnake was kept. She had considerable distress after her potion; but, to the astonishment of her doctor, she entirely recovered from her dropsy." *Brit. Journ. Hom.*, viii, 30.

Hydrophobia.—In the *Med. Times and Gaz.*, Dec. 1st, 1883, Dr. RICHARD NEALE writes: "A glance at the *Medical Digest* (Sec. **526**, 3) will show that in 1874 the value of inoculating the venom of the adder (rattlesnake) was apparently established by several experiments and observations in cases of hydrophobia."

Further evidence in support of the curative power of Crotalus in these diseases is afforded by the many cures recorded with the more familiar and very similarly-acting serpent-venom, lachesis. v. *Jahr's New Manual*, ii, 57; HEMPEL'S *Mat. Med.*, p. 1145; also *Amer. Hom. Rev.*, 1863, pp. 556—562, where will be found quite a list of cures, including two cases of epilepsy, two of hydrophobia; and one of spasms in a child, with frequently recurring loss of sight and consciousness. And yet further evidence is afforded by the recorded experience with the other very similarly-acting serpent venom, naja. DR. BRADSHAW relates a case of chorea cured by it. *Annals of Brit. Hom. Soc.*, i, 297. DR. JOUSSET says tarantula has given him more successes in the treatment of chorea than any other remedy; and he considers it of at least equal value with ignatia in hysteria, especially when it assumes the convulsive form. *Hughes's Therapeutics*, i, 257, 259.

DIGITALIS.

BY

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DIGITALIS PURPUREA.

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Synonyms.

English, Foxglove. *German*, Fingerhut, Fingerkraut, Waldglöcklein, Spitzwundkraut. *French*, Digitale, Doigtier, Gant de Notre Dame. *Dutch*, Vingerhoedskruth, Vingerhooder. *Italian*, Digitello. *Spanish*, Didolera.

Natural History.

1. Digitalis Purpurea, Foxglove, a biennial plant, Natural Order Luridæ (*Linn.*), Scrophulariaceæ (*Juss.*); Didynamia Angiospermia; is a common plant in Europe, flowering from June to August. It is cultivated in gardens, but this deprives it of much medicinal power, it ought therefore to be collected in hilly districts, and growing on sunny banks. Figured in Withering (1), and in Hamilton (*Flora Hom.*, p. 1, 29). The Digitalis Ambigua, which grows abundantly on the mountains of Provence and in Italy, as also the Italian species, the Digitalis Epiglottis, the Lævigata of Lamarck, have been used by various physicians in Italy, some of whom prefer them to the Purpurea.

Pharmacy and Chemistry.

2. The whole plant possesses therapeutic properties, but the leaves are now only used. They ought to be gathered from the full grown upper leaves of plants in their second year, just before or about inflorescence; the petioles ought to be rejected. The dried leaves are materially injured by exposure to light and air, they require to be kept in dark, well-stoppered bottles. The Tincture is also affected by light. The dried leaves have a dull green colour, a faint odour, and a bitter nauseous taste. The Chemistry of Digitalis was in an unsatisfactory state until the researches of Homolle and Quevenne, who received in 1841 a prize from the Soc. of Pharm. of Paris, for their discovery of what they considered the active principle, and to which they gave the name of Digitaline. According to their analysis, which has been mainly confirmed by other chemists, an infusion of Digitalis contains digitaline, digitalose, digitalin, digitalide, digitalic acid, antirhirric acid, a volatile oil, and ligneous fibre. The digitaline of Homolle and Quevenne consists of small white flakes of a bitter taste, sparingly soluble in water, readily so in alcohol and acetic acid. Walz obtained, in his investigations, digitalin, digitasolin, digitalacrin, digitalosin, and digitaloic acid. He exhibited his digitalin as a yellowish, uncrystallizable powder, readily soluble in cold and warm water (16, p. 9). Nativelle threw further light on the various kinds of digitalin, he exhibited an active body in a crystalline form, digitalëin; secondly, an amorphous body of a bitter taste and having active properties, digitalin; and thirdly, a crystalline body, tasteless and inactive, which he named

inert crystalline substance (*Jahrb. Pharm.*, xii, 83; xiv, 20). Gorz, following Nativelle's method, gives three chief constituents: 1st. crystallized digitalin, 2nd. the amorphous digitalëin, 3rd. crystalline digitin; the last has no physiological action. Schmiedberg states that there are four substances which produce the effect of Digitalis: 1st. Digitonine, a glycoside, which has a resemblance to saponin in its physiological and chemical qualities. 2nd. Digitaline, a glycoside, which is insoluble in water. 3rd. Digitalëine, also a glycoside, is distinguished by its ready solubility in water; it unites the properties of digitonine and digitaline. 4th. Digitoxine, which is the most powerful agent of all. These four principles constitute the great bulk of the ordinary digitalines.

3. Koppe, under the direction of Schmiedeberg, and by experiments partly on himself, partly on animals, has come to the conclusion that the qualitative action of digitoxine, digitalin, and digitalëin is identical with each other, and with the mother plant, but that there are quantitative differences (21, p. 707). The general opinion now is that digitaline, if not actually the active principle in Digitalis, is by far the most important; and numerous experiments of Homolle's, Bähr's, and others', in addition to Koppe's, show that it produces the same physiological and therapeutic effects as the plant itself. Fothergill (18, p. 7) thinks Digitalis acts more powerfully on frogs than digitaline. According to Widal digitaline is a much less energetic reducer of temperature than Digitalis (25). Nothnagel gives a decided preference to the plant as being more certain in its action, and more readily prescribed than the active principles (34*a*).

4. The extreme bitterness of digitaline is used by Homolle and Quevenne as a test of its purity. Dissolve 1 centigramme ($\frac{1}{7}$ nearly of a grain) in 2 grammes (about 31 minims) of alcohol, dilute this gradually with water until bitterness completely disappears, if good it will require two pints of water to effect this. It gives a sensible bitterness to 200,000 parts of water.

5. *Preparation of Digitalis and Dose.—Brit. Pharm.*—Dried leaves, dose ½ gr. to 1½ gr. Infusion, 3 gr. of the dried leaves to 1 fluid ounce of water; the dose a drachm to 1 ounce. Tincture, 54½ gr. to 1 fluid ounce of spirit; dose from 10 to 40 minims.

Brit. Hom. Pharm.—The fresh expressed juice of the leaves added to equal parts of alcohol. The dried leaves ought also to be kept for triturations, and digitaline 1 grain dissolved in 100 minims of pure alcohol, for further dilution as required (20).

Hahnemann recommends from the 15th to the 30th dil., but later experience has shown that more benefit is derived from larger doses. Hughes (20) expresses the writer's as also Bähr's and Jousset's experience when he states that according to general testimony rarely any benefit is seen from dilutions above 1 cent., and generally the 1ˣ and pure tincture are more efficacious. Digitaline, dose from $\frac{1}{50}$ gr. to 3 cent. dil.

Ringer believes that in giving Digitalis the formula has much to do with the success of the drug. He considers the fresh and well made infusion gives generally better results than the tincture. He prescribes ʒj of the infusion not more than three times a day, the effects to be

carefully watched. If no effects follow then the frequency of the dose is to be cautiously increased (19, p. 450).

Dr. Fothergill prefers the powdered leaves (18). Homolle and Quevenne prefer digitaline as affording an unvariable preparation, whereas the ordinary forms of Digitalis vary often exceedingly in quality (11). They prescribe it in granules each containing a milligramme, $\frac{1}{65}$ of a grain. The English and the French digitaline are similar in dose and effects; the German preparation of digitalëin, which is easily soluble in water, is less active, $\frac{1}{5}$ of a gr. is the maximum dose. Finselberg's preparation, dose as advertised is 1 to 4 milligrammes. Keith, of New York, has a preparation which he calls digitalin, but it is much weaker than the officinal preparation; dose $\frac{1}{8}$ to $\frac{1}{4}$ gr.

6. *External use.*—It has from its earliest use been applied locally in acute inflammation of the joints, in ulcers, various strumous affections. The tincture, ointments made with the leaves, have been used as frictions. Infusions or the fresh juice of the plant or poultices made with the leaves applied to the abdomen have proved very useful in dropsical effusions dependent on cardiac disease, and in suppression of urine.

7. *Hypodermic use.*—Homolle found that a milligramme, $\frac{1}{65}$ of a grain, applied to the denuded epidermis, and repeated in ten hours, sets up swelling, redness, and painful tension of the surrounding parts. Gubler announced to the Soc. de Thérapeutique of Paris (February 13th, 1878) that the amorphous digitaline of Homolle and Quevenne (digitalinum, Br. P.) may be safely used hypodermically. Two milligrammes are dissolved in 1 gramme of a mixture of equal parts of water and alcohol; he injects half a syringeful, 1 milligramme. It manifests all the effects of Digitalis and does not produce any local action (*Lond. Med. Rec.*, 1878, p. 129). A German preparation of Finselberg's is sold which, being freely soluble in water, is well adapted for hypodermic use. According to Nothnagel digitaline and digitalëine produce no local action, whereas the hypodermic injection of digitoxine, even in very weak doses, sets up phlegmonous inflammation followed by suppuration (34*a*, p. 688).

8. *Poisonous Doses.*—It is difficult to determine the doses which lead to poisoning, owing to the difference of various preparations and their quality. The tincture has even sometimes been prescribed medicinally in doses of half an ounce to an ounce, and even two ounces have been taken in two doses without giving rise to the slightest inconvenience. Pereira saw twenty drops of the tincture given to an infant suffering from hydrocephalus, three times daily for a fortnight, at the end of which time there was complete recovery without one untoward symptom (8, p. 1212). This tolerance may partly be due to the disease, partly to great variation in the alcoholic solution (Taylor), partly, as Hughes (20, p. 349) suggests, to the amount or alcohol. A dose of the leaves, of the infusion, or of digitaline corresponding to the above, could not be given without danger.

9. *Tests.*—The detection of the products of Digitalis in the blood, in the tissues, and in the urine is difficult and uncertain, owing probably to the entire constituents of Digitalis suffering decomposition in the

organism. Taylor considers there are no chemical processes by which the nature of the poison can be determined (10*a*, p. 348).

Tardieu failed to find any special test in the famous trial of de la Pommerais (17).

The active principle digitalin, free from organic substances, can be tested by hydrochloric acid, which gives a very beautiful emerald green colour. According to Grandeau's process (*Gaz. des Hôpit.*, 1864, 69) the substance to be tested is moistened with concentrated sulphuric acid, then exposed to a vapour of bromine when it assumes a violent colour. Tardieu thinks this test is of no value in medical jurisprudence (17, p. 655).

10. *A physiological test* has been proposed in the well-known action of Digitalis on the frog's heart. The application must be made hypodermically, not by the stomach; for it has been shown that the contents of the human stomach act in almost every instance in which trial was made of them on frogs as a cardiac poison (32). But at the best such a test is merely approximative, it may testify to a cardiac poison, but not specially to Digitalis.

11. *Treatment of Poisoning.*—In the rare cases where there is no vomiting an emetic or stomach-pump is to be used. Tannin has been recommended as forming a partially insoluble compound with Digitalis. The indication is to avert cardiac paralysis, this is attempted by various stimuli, camphor, ether, alcohol, coffee, tea, &c.; in addition to the ordinary agents, the use of veratrine in minute doses might be tried.

History.

12. The first botanical notice of foxglove was made by Fuchsius, in 1542, when he gave it, from its familiar German appellation Fingerhut, the name of Digitalis.

It was in early times employed as a domestic specific for scrofulous ulcers and tumours, and even by early writers (Van Helmont, Haller, Quarin, Merz, Parkinson, Baylies in Worcester Infirmary) it was highly extolled as an external application and internal remedy for various forms of scrofula. Boerhave simply judged it to be of a poisonous nature; Alston goes beyond this and ranks it "among those indigenous vegetables which, though now disregarded, are medicines of great value, and scarcely inferior to any that the Indies afford" (1).

Salerne seems to have been the first to institute experiments on animals with Digitalis, but his results from turkeys threw no light on its action (*Hist. de l'Acad.*, 1748, p. 48). A few years later further experiments on animals were made by Schiemen, and he published these with cases illustrative of its efficacy in scrofulous affections (*Gottingae*, 1786).

In 1721, Digitalis takes its place in the *London Pharmacopœia*, it is excluded from the edition of 1746, but is reinstated in that of 1788, having already appeared in the *Edinburgh Pharm.* of 1783.

C. Darwin (son of Erasmus Darwin) in 1780 drew attention to its power in dropsy, but the reinstatement of Digitalis in the Pharmacopœia

was no doubt due to the prominence given to this drug by Withering, who in 1785 published the first work of decided merit on the clinical uses of this plant. He was led in 1775 to give it a systematic trial from its constituting the principal ingredient in a secret and renowned remedy for dropsy, sold by an old woman in Shropshire. His observations bear principally on dropsies, but he also tried it in pulmonary phthisis, because the peasants in the West of England had traditional faith in its efficacy.

Withering's work, showing the power of Digitalis on the heart and pulse, led to the general employment of this drug in Europe and in America, not only as a remedy for dropsies and cardiac diseases, but also in phthisis, in various forms of hæmorrhage, in epilepsy, and inflammatory affections. The translation of his work by Michaelis (*Leipsic*, 1786) soon excited interest in this drug in Germany; and to the observers in that country we have since been much indebted for a knowledge of Digitalis. Its fame soon spread to America, where Rûsh and Mease disparaged its employment, while Chapman formed the most favourable opinion of its value. He saw the true indication for the remedy when he regards a low and enfeebled condition of the constitution as most propitious for its exhibition (23, p. 282). Rasori and Tommasini in Italy laboured, but without success, to prove its contra-stimulant or directly sedative action. Its recent use in inflammations and in fevers is a revival of the Italian practice, showing now, as then, its small and doubtful power in modifying pyrexia.

The power to depress cardiac action was for long considered the indication for its use in hypertrophy and over-action of heart. The experiments of Sanders (*Edin.*, 1808) and of Hutchinson, and those of Moore (*Philadelphia Thesis*, 1800), tended in a manner to alter these views; soon a reaction took place, and the writings of Kinglake, Traube, Fuller, Handfield Jones, and Brunton, led to the modern view that Digitalis is a tonic not a depressant of the circulation. Now most physicians who write of its action recommend it in dilatation of the heart, and wherever cardiac asthenia is present. This view of its action is drawn from therapeutic results, not from experiments on the healthy, for numerous observations of the latter kind show its marked asthenic character, and its efficacious use in arythmic asystolia corresponds with the homœopathic formula.

Of Continental writers, the very able and complete treatise of Bähr, published at Leipsic in 1859, gives up to that date the fullest account of the history, physiological action, and therapeutic uses of Digitalis and digitaline (15).

Lauder Brunton's monograph, 1868, is the fullest English treatise; he speaks from carefully conducted experiments on himself and animals, besides collecting the experience of Blake, Traube, Winogrady, Briquet, Kölliker, Dybkowsky, Pellican, Eulenberg, Ehrenhaus, Winogradoff, Stadion, Dumeril, Handfield Jones, Fagge, and Stephenson.

Physiological Action.

13. There are few medicines whose physiological action has been so much discussed as Digitalis. Much of the discrepancy as to its effects has arisen from therapeutic results being taken as representing physiological action; whereas accuracy can only be approached by the study of experiments made on healthy persons.

The action of Digitalis is manifested principally on the stomach and circulatory organs, then on the brain and muscles, especially the involuntary; in a less degree it acts on the urinary and genital functions. These effects are manifested whether the drug is given by the stomach or applied externally. In some individuals there is a great tolerance of Digitalis (Exp. 7*a*).

14. In other persons its use, even in moderate doses, has a cumulative effect, producing very dangerous symptoms, which in some cases terminate in death. Owing to this cumulative property, its action may persist for a long time, and even increase in severity (*Poisoning*, No. 3).

15. In Exp. 1, Dr. Hutchinson, after discontinuing the Digitalis, was confined to his bed for two weeks, and he experienced the effects of the drug for two months. In a case of asthma where an overdose was taken, the stomach and especially the heart symptoms continued for nine days, the disorder of vision, the fire appearing blue, lasted fourteen days. In Exp. 8 the pulse keeps under the average for twenty-four days after the last dose. In Exp. 8*a*, where a full dose is taken, eight hours elapse before signs of action present themselves, when the symptoms are severe; in various cases of poisoning many hours elapse after taking Digitalis before any symptoms are manifest (*Poisoning*, Nos. 8, 10).

16. Given in small and repeated doses, Digitalis shows its action on either the stomach or circulatory organs or on both together; these symptoms observe no regular order. There is nausea and vomiting, slight tendency to diarrhœa, colicky pains, quickened and generally weak pulse easily affected by motion, uneasiness at the heart sometimes amounting to pain, palpitations, restless nights, and muscular and mental debility.

17. In longer continued or larger doses, all these symptoms become more marked, there is disorder of vision, headache and vertigo, extreme weakness muscular and mental, the urinary organs irritated, diuresis, excitement of sexual organs in men. The pulse is quickened, more rarely retarded, but in either case it is weak, irregular, and intermittent.

If these doses are continued, the gastro-intestinal irritation increases, marked by excessive nausea and vomiting, frequently salivation, a peculiar kind of intoxication, vertigo, disordered vision, headache, generally diarrhœa and slight diuresis are present, the heart's action becomes weaker, shown in palpitations, oppressed breathing, the pulse quickened, but much more frequently remarkably retarded, weak, and intermittent, and when slow, readily quickened and weakened by change of position; syncope, or tendency thereto; temporary impotence.

18. A still larger dose excites vomiting, and in four to six hours after or even longer, there are headache, giddiness, slow, feeble, irregular pulse, great faintness, and disordered vision, then sudden acceleration of the pulse, coldness of the body, cold sweats, general cyanosis, coma, convulsions, and death resulting either from syncope or from carbonic acid poisoning.

The course of Digitalis poisoning is rather subacute, lasting many days, death occurring in four to five days or even not until the thirteenth; but death may take place in twenty-four hours (*Poisoning*, No. 1). Even when decided improvement is manifested, sudden and fatal cardiac paralysis may take place, as, for example, in getting into bed, after an action of the bowels (*P.* No. 5).

Circulatory Organs.

19. It is on the heart and blood-vessels that Digitalis exercises its most noteworthy action. Does it strengthen or does it weaken cardiac action is the important question? The answer has been sought too much in the therapeutic results of Digitalis, instead of in the now numerous experiments on healthy persons; these may be supplemented by experiments on the lower animals. It is admitted by all that large doses produce cardiac paralysis, the contention is as to the effects of small and medicinal doses.

At the end of this preface twenty experiments are recorded where Digitalis and its active principle digitaline have been taken by healthy persons, also abstracts of other experiments are alluded to.

20. A careful perusal of these experiments conveys the impression that the physiological action of Digitalis in small or medicinal doses does not present the ordinary signs of a cardiac tonic.

In Experiments 1, 1*a*, 3, 4, 5, 7, 9, 10, there is acceleration of the pulse, not very marked in some but still observable. In Exp. 8, there is in two persons lowering of the pulse by one to three beats, in four others not fully reported there was a raising or lowering of the pulse by one or two beats, generally the former. In Exp. 8*a*, a large dose is taken, no action for eight hours, then faintness and vomiting for thirty hours; after this the pulse fell to 48, and vision was much disordered. In Exp. 15, after taking two milligrammes, equal to about one thirtieth of a grain, of crystallised digitaline, in an hour it caused faintness, nausea, and slight vertigo, the pulse remained as usual 80 to 84, and was regular. In three hours, with rapidly increasing weakness and loss of power, the pulse in bed fell to 58, intermitting after thirty to forty beats. Soon violent vomiting came on, and the pulse fell to 40 to 42, with an intermission after every two beats, the sphygmographic tracing showing all the signs of weakened heart and arterial tension for two days after.

In only one experiment (No. 1), is there the appearance of increased vigour in the heart; in this instance, after drachm doses of the tincture of Digitalis had been taken thrice in one day, the pulse rises to 100, strong, and full; the action of the heart more violent, more easily

felt internally, and could be seen externally; with similar doses on the second day, the pulse is 125, strong, and wiry, and in the evening it is 150, small, hard, and wiry, the action of the heart more feeble and accompanied with palpitations; the mental condition bordering on delirium. Next day no more Digitalis is taken, the pulse falls to 60, small, feeble, but regular. In the two other experiments on the same person and with full doses (in twenty-seven days he took 2220 drops in the second experiment, and in the third 1694 drops in fourteen days), the results are much the same, only the doses being more moderate, the effects were not so marked. After 1140 drops have been taken in twenty-two days the pulse is 85 when sitting, 95 on walking a little, the beating of the heart stronger than usual; on the twenty-fifth day, after 1720 drops in all have been taken, the pulse is 85 on remaining quiet, rising to 100 after gentle exercise. The action of the heart was irregular and appeared to have increased in force for a short time, and then approached its natural state. Three days after this (2220 drops), the pulse is 85, rather weak and irregular, especially after exercise. Uneasiness at the heart and palpitation were experienced at each movement of the body. In the third experiment, after 519 drops are taken in eight days, the pulse falls from 80 to 50, the action of the heart is remarkably violent, and this violent action is noted for six days after; the pulse being 46, the shock rapid and separated by a considerable interval, rising on slight movement to 70 and 80, and becoming irregular and less full. The No. 1 Exp. shows increased irritability of some of the cardiac nerves, but this kind of irritability is often increased before it is entirely lost, and increased irritability of a nerve is not a sign of increased normal strength or nutrition, but on the contrary, of their diminution.

Germain's experiments on himself with the tincture, and also with the powdered leaves of Digitalis, show a lowering of the pulse from 70 to 56, and in another to 50, but no indication of cardiac vigour (29, p. 712).

Tardieu says the action consists in an acceleration, soon followed by an increasing slowing of the beats (17).

In Homolle's experiments (11), out of eighteen there is acceleration of pulse in only three persons, but no indications of gain in force, though the pulse is slightly lowered.

Legroux, as the result of his experiments, admits that after moderate doses there is first acceleration, more frequently a slight retardation, often for the first days no effects, then if the dose be continued the pulse becomes irregular and intermittent (27. p. 118).

21. In opposition to the experiments now alluded to is the counter-testimony of Dr. Balthazar Foster. "I made," he writes, "a series of observations on the effects produced by Digitalis when administered to healthy persons, and to patients free from heart mischief. Giving it in moderate doses, ʒj to ʒij of the infusion three times a day, I obtained results agreeing with those of other observers. The pulse traces showed first a diminution in the frequency of the heart's beats, second an increase in the force of each beat, third an increase in arterial tension" (28). Such results point to tonic cardiac action, but their value is diminished by the absence of details (he giving merely conclusions), and

by several of the subjects suffering from disease. If observations are limited to physiological experiments on healthy persons, then Dr. Foster is mistaken in supposing his results agree with those of other observers. The experiments now given point in a different direction.

22. To these may be added Orfila (10). In the experiments on his own person, he says: "Digitalis had sometimes no effect on the circulation, sometimes the pulsations of heart were rendered slower, not unfrequently they were quickened, strong, irregular, intermittent."

23. Dr. Copeland writes, "I tried the effects of it on myself in large doses in different forms of preparation." In one experiment, taking two drachms while in good health and finding no effects, he repeated one drachm in three hours. "The pulse was not affected by it during that and the subsequent day, further than it was readily accelerated by the least exertion." He remarks on this characteristic property of Digitalis, which has been noticed by many observers and is marked in many experiments (Exp. 1, 9, 12, 8 *b*, 8 *c*, 9), that if the heart were really strengthened this marked difference in speed and strength between the pulse in the recumbent position and that when standing or moving slightly, in a much greater ratio than in health, could not exist (14, p. 357).

24. Pereira observes: "Now the power of the heart being enfeebled by foxglove, when a demand is made on this viscus for an increase in the force of the contractions, by the change from the recumbent to the standing attitude, it endeavours to make up for its diminished force by an increase in the frequency of its contractions" (8, p. 1210).

25. Stillé says: "That Digitalis does not give a real increase of power in the heart is shown by the fact that when the pulse-rate is slowest a comparatively slight muscular exertion will cause the pulse to rise from the lowest point reached to one far above the normal rate" (23).

26. Similar testimony is borne by Nothnagel (34, *a*).

27. Is violent action or impulse of the heart a sign of increased tone?

Numerous observations show that after a strong dose of Digitalis there is surprising weakness of the cardiac pulsations, ending in complete paralysis. Brunton admits this may be true in regard to overwhelmingly large doses, but in his experiments on animals the impulse is increased so generally, in fact, that he had not noted it, looking on it as to be always expected (16, p. 29). Turning to his experiments on animals, which have the disturbing influence of anæsthesia from chloroform and the struggles from the pain inflicted, there are entries such as: "Heart's action extremely irregular in number and force (Exp. i and ii); pulse small and irregular, weak and jerking; action of heart violent, thumping, extreme irregularity of heart (Exp. v); heart's impulse felt distinctly and apparently increased; loud blowing murmur; pulse cannot well be counted, it is so quick, small, and irregular" (Exp. vi). "Heart acts very irregularly, the sounds are like toot-toot-toot-toot-too; heart very weak" (Exp. vii). "Pulse very markedly intermittent, small" (Exp. viii and ix), &c.

These extracts show that the increased impulse is not that of vigour,

but a sign that the heart is overtaxed, and that it is labouring on account of feebleness. Similar conditions are recorded in the experiments by Hope and Marshall Hall on dogs rendered anæmic by loss of blood, when the systolic sounds of the heart, previously loud and clear, become attended with a whizzing, sawing murmur, the impulse increased and became unusually smart or abrupt, the pulse quick and jerking, with a thrill and a throbbing perceptible over the whole heart (*Dis. of Heart*, 1839, p. 100).

The violent, abrupt impulse of heart produced by Digitalis is not one of tone, but is of the same character as that met with in weak, nervous, or anæmic persons.

28. Palpitation of the heart is an effect of Digitalis; it is sometimes shown in increased impulse or frequency of action, attended or unattended by cardiac pain; it may be a series of distinct beats, or a trembling or rolling motion, with feelings of anxiety, tightness, and oppression. A heart in this condition shows increased excitability, but this is not a sign of increased normal power but of its diminution. Palpitation is the first evidence of failure of power, it is a sign of incapacity, a laborious stroke but not a stronger one. It is the evidence of effort, not of capacity, and is barren in result (18, p. 13).

29. The contraction of ventricles of frogs killed by Digitalis is adduced as evidence of the tonic cardiac properties of this drug. This condition seems constant in frogs and some fishes, but is rarely seen in Mammalia.

In seventeen experiments on dogs, conducted by Orfila, contraction of the ventricle was not seen in any instance; on the contrary, the heart is found motionless in diastole, the left ventricle full of fluid red blood, the right with coagulated dark blood; sometimes the blood in both ventricles was liquid. He considers all his observations establish the similarity of action on men and on dogs (10, p. 411—420).

Tardieu killed a dog in forty-eight minutes with digitaline; the thorax was immediately opened, the heart was dilated, gorged with black blood; in three to four minutes it commenced to contract, and remained rigid until next morning (17, p. 677).

In Brunton's twelve experiments, eleven on dogs and one on a sheep, the left ventricle is firmly contracted in one dog and in the sheep; in the remaining experiments the left ventricle is flaccid and contains blood (16, p. 91—120).

Faure, in his twelve experiments on dogs by digitaline used hypodermically, found that in eleven the ventricles were full of liquid or coagulated blood, and in the twelfth experiment there were thick fibrinous clots in both ventricles, especially the right (30, p. 416).

Von Boeck states the autopsies of men poisoned by Digitalis are very rare; the appearances found are those which are the constant result of cardiac paralysis, the heart is flaccid, and full of partially coagulated blood (21, p. 718). In the case of a soldier poisoned by Digitalis, the post-mortem showed the right side of heart full, the left empty (*Poisoning*, No. 6). The post-mortem condition of the heart in dogs and in men is very different from that seen in frogs.

30. But is the firmly contracted heart in frogs and in the two instances reported above by Brunton evidence of tone, of increased power?

The cardiac action of Digitalis on frogs was first accurately observed in 1853 by Vulpian, and he gave his evidence afterwards in the famous trial (1863) of Dr. de la Pommerais for the poisoning of Mad. Pauw to this effect: in the great majority of cases the ventricle is pale and contracted (when the heart has ceased to beat), and the auricles are dilated. The peculiarity of the heart's action is that the change takes place while the animal still preserves the power of motion (31). The value of a physiological test, in poisoning by Digitalis, was after this trial very freely investigated by Fagge and Stephenson (32). They confirmed Vulpian's results, showing that "the characteristic effects of those agents [Digitalis, scilla, antiar, helleborus] on frogs is the production of irregularity of the heart's action followed by complete stoppage of its pulsations, the ventricle remaining rigidly contracted and pale after it has ceased to beat, the muscular power of the animal being at the same time unimpaired." The rhythm of the heart's beats is not generally much altered, but they become peristaltic, or different parts of the muscular wall of the ventricle contract and dilate at different times, the blood forming pouches in the relaxed portion of the ventricles. Nunneley, who has made numerous observations on the action of digitaline on frogs, says the ventricular systole is lengthened, but it presents a very different appearance to the systole in health. "The ventricle seems no longer to act as a single large muscle, but as if made up of numerous small ones, which contract energetically but in an irregular and disorderly way; hence there are projected bundles of contracted muscular fibres which give the ventricle a rough and uneven surface and an irregular outline. During the diastole the ventricle does not everywhere assume a red colour, but one or more red spots appear as if the ventricle were so tightly compressed that only a small quantity of blood could enter it by chance" (19, p. 440). Take this account and also his description of what occurs sometimes after the injection of a dose under the skin, when the frog has paroxysms of gasping movements lasting from half a minute to a minute and a half, and when this paroxysm has passed off the frog jumps about with energy. "It is worthy of remark," he adds, "that whilst the embarrassment to the action of the heart is continuous, the gasping movements are paroxysmal, as in human beings when the cardiac dyspnœa occurs in fits, whilst the condition of the heart remains constant." The experiments of Eulenberg and Ehrenhaus, and of Fothergill, all agree and point in the same direction.

This firm contraction of the ventricles is not evidence of tonic action, of increased power, but clearly manifests a want of co-ordination in the contraction of the individual fibres, and this contraction being that of tetanised muscular fibre, which continuing becomes rigor mortis (20, p. 343). The chemical, electric, and mechanical phenomena occurring during ordinary contractions and tetanic contractions or rigor are identical, but in the latter case the muscular fibre does not regain its normal extension owing to the non- or insufficient renewal of the essential energy-yielding substance. This renewal depends on the

withdrawal of arterial blood, or in some peculiar modification of the blood.

31. In the case of frogs killed by Digitalis the contracted state of heart may be due to the pale condition of the ventricle, or to such alteration of the blood as is equivalent to loss of blood. Harley's experiments with weak solution of strychnia or brucia show that air which has remained in contact with blood to which minute quantities of strychnia or brucia have been added is deprived of full two thirds of its natural power of becoming arterial. Another experiment consisted in placing the hearts of two frogs, one in a vessel containing simple water, and the other in a vessel containing a very weak solution of strychnine. The heart which is immersed in plain water is found to go on beating regularly for some time after the heart immersed in the solution of strychnia or brucia has passed into the state of rigor mortis. Here it is evident strychnia or brucia do not exalt but depress the vital properties of the cardiac muscles and nerves (*Lancet*, 1856, 7th, 14th June, to 12th July). These results are analogous to those furnished by the experiments of Eulenberg (35), and Ehrenhaus, and Legroux (27), on the extirpated frog's heart, which when its lower third was immersed in a solution of digitaline had its motion completely stopped if the solution was strong ($\frac{1}{2}$ gr. to $\bar{3}$j aq.); pulsation recommenced on removal from the solution. If half the above strength were used the pulsations increased in frequency, then there was a pause, and as the length of the pauses increased, so the number of pulsations between the pauses increased in frequency (*loc. cit*). The production of irregularity of the heart's action in frogs, followed by complete stoppage of the pulsations, implies not a state of augmented vitality in nerve or muscle, but the contrary.

32. Because in practice it is found that Digitalis strengthens a feeble heart, therefore it is concluded by many writers (Handfield Jones, Fuller, Winogradoff, Brunton, Foster), that its physiological action is tonic. This is assuming, not demonstrating the physiological action, for the numerous experiments already alluded to prove that such is not the case. The use of the word tonic restricts the inquiry to *plus* and *minus* conditions, ignoring that Digitalis like numerous remedies modifies vital action in a direction not measured by greater or less. "I cannot help thinking," says Ringer, "however, that the tonic theory regarding Digitalis fails in most instances to explain its usefulness in heart disease" (19, p. 459).

33. *Arterial Tension.*—Digitalis injected into the veins in small doses causes no changes in the mean tension of the arteries. In larger doses it almost invariably increases the tension, sometimes very slightly, at other times considerably. The tension attains its maximum in 3 or 4 to 9 or 10 minutes, and then gradually diminishes (16, p. 31).

Lombard, after numerous experiments made conscientiously and with all the necessary scientific requirements, found the following results after introducing the infusion of Digitalis into the veins of dogs, &c. *First*, the most constant effect in medicinal or toxical doses was diminution of the arterial tension directly the drug begins to produce its effects. *Second*, the constant and progressive weakening of the tension

shows that Digitalis acts primarily on the heart, and has a direct effect on the motor nerve-centres of the heart. *Third*, with diminution of tension the temperature falls. *Fourth*, when the system is fully under the influence of Digitalis the pulse falls suddenly and considerably, and then the respiration becomes irregular (33, p. 70).

34. *Arterioles and Capillaries.*—Blake was the first to state that Digitalis possesses the power of contracting the capillaries; Brunton considers this view correct, but as the poisonous action becomes more fully developed the capillaries become dilated (p. 32). Brunton and Meyer conclude from further experiments, made by injecting digitaline into the carotid artery of dogs, that it causes contraction of the arterioles (*Journ. Anat. and Physiol.*, 1872, p. 134). Ackermann has been able to demonstrate the contraction followed by distension in the mesenteric vessels of the rabbit (21, p. 714). Legroux says Galen, in an inaugural thesis, has shown that Digitalis causes contraction of capillaries, arterial and venous, in frogs, but that he himself has in vain looked for it, though he noticed it in an experiment on a rabbit's ear (34, p. 135). Without direct proof, he regards the principal action of Digitalis to consist primarily in causing contraction of the capillary vessels.

The contractility of the cardiac muscles being very dependent on their supply of arterial blood, as shown in ligature or disease of the coronary arteries, it is evident that disturbance of the capillary circulation of the heart must exert a powerful influence over its mode of pulsation.

35. *The temperature* is rarely affected until powerful doses have first reduced the frequency of the heart's beat (*P.* No. 5). Winogradoff calls attention to the fact that in health the influence of Digitalis in depressing the temperature is very much less than in pyrexia (44). In moderate doses, as in Exp. 14, there is occasionally general heat all over the body, with quick pulse; or, as in Exp. 1, a chilliness followed by considerable heat of the skin. Generally the action of Digitalis on the temperature is not marked either by increase or diminution as long as the doses are moderate: after poisonous doses there is icy coldness of the surface.

Experiments on horses, by Bouley and Renal, show that poisonous doses produce first increase then decrease of the temperature, but that therapeutic doses cause a steady diminution, without previous increase (16, p. 43).

36. Theories as to the cardiac action of Digitalis have led to much dispute, and none of them meet entirely all the phenomena. This is not matter of surprise when the extreme difficulty of the subject is considered. The influences bearing on the circulating organs from the heart to the capillaries are so numerous, and knowledge of them is too incomplete to permit of a clear conception of the whole of the complex system.

The heart consists of several strata of muscular fibres, and these though removed from the control of the will are transversely fibroid, but differing from similar structure in the voluntary muscles, in that the fibres ramify and join together. These muscles have two sources of

innervation, one, which is probably the real motive power of the heart, is in the minute ganglia and ganglionic cells distributed in the muscular fibres; this musculo-motor system of nerves causes and regulates the automatic rhythmical contraction of the heart; another, the nerves which enter the heart from the cardiac plexus, and are derived partly from the vagus, partly from the sympathetic. The fibres contained in the vagus possess the power of slowing or weakening the contraction of the heart, and the irritation if powerful is capable of bringing the whole heart to a stand still in diastole. Section of the vagi suddenly increases the frequency of the pulse; it is, however, to be remembered that slight excitation of the vagus occasionally causes an increase in the number of heart's beats (*Hermann*, p. 73). But in addition to these nervous influences, there is a more complex and less understood one, due to accelerator nerves, which have been demonstrated by the Cyons, Cl. Bernard, Schmiedberg, and v. Bezold; these are supposed to call into action increased power against obstruction. There is also another called the depressor nerve, which Bernard thinks allows of a temporary distension of heart in order to ease the circulation (18.) These accelerating nerves proceed from the medulla oblongata, and this acceleration is a complex phenomenon inasmuch as excitation of the medulla oblongata produces simultaneously a contraction of the arterial system which of itself increases the frequency of the pulse. Now, though in all probability the main action lies between the ganglionic nerves and the vagi, still any theory of the action of Digitalis ought to embrace the accelerating and depressing nerves; but no hypothesis as yet considers them as factors, or estimates the effect of these in combination with the vaso-motor, the musculo-motor ganglia, the vagi, and muscular fibres.

The principal theories are as follows:

37. *Traube*, who has experimented very fully on animals, considers that Digitalis exerts its influence on the heart by stimulating the vagus and ganglionic or musculo-motory systems of nerves, and finally paralysing both sets of nerves; the arterial tension being the product of these two factors (37).

On this, Brunton remarks that Traube's theory is imperfect, for he makes the arterial tension the product of what is really one factor, leaving altogether out of account the other equally important one—the size of the capillaries (16, p. 51).

38. *Dybkowsky* and *Pellikan* think Digitalis exerts its influence directly on the musculo-motor system, without the intervention of the vagi (16, p. 51).

This view was, some time before the last experiments, held by Stannius, who, from observing that when cats are subjected to the action of Digitalis, the cardiac pulsations became slower as well as irregular and intermittent, and that the diastolic movements finally ceased, and could not be excited again by direct irritation, concluded that there was paralysis of the cardiac muscle (36).

39. Brunton considers that Digitalis acts on the regulating apparatus of the heart chiefly through the vagus, thus causing slowing of the heart, and stimulates the musculo-motory apparatus, causing increased force of the cardiac contractions. This primary stimulation then gives way to paralysis, at first partial then complete (16, p. 52). Further observations led him to conclude that the heightening of arterial pressure, due to the influence of Digitalis on the arterioles, slows the heart and, not entirely, the direct influence of the vagus (*Journ. of Anat. and Physiol.*, 1872, p. 134).

Brunton, in remarking on Ackermann's experiments, says that Ackermann's conclusion that stimulation of the vagus and slowness of the pulse are not due to increased blood pressure, was arrived at by him seven years before (16, p. 21). He now considers, however, that digitaline has a direct action on the vagus roots, and sometimes slows the pulse in this way, even when the blood pressure is low; but that

there is no necessity for denying the increased blood pressure, produced by digitaline, that effect on the vagus roots which it possesses when arising from other causes (*Lond. Med. Rec.*, January 15th, 1878, p. 21).

Gouvrat also believes the slowness of pulse due to the increased blood pressure, and is in proportion to this (*Gaz. Méd.*, 1871, No. 26).

40. Boehm says digitaline increases the irritability of the inhibitory nerve situated in the heart, and exercises a specific action on the muscular fibres of the heart, first of all increasing their contractility, next rendering their contractions irregular, and finally conferring on them a peculiar rigidity (*Syd. Yr. Bk.*, 1872, p. 471).

41. Legroux strives to show the similarity between the effects of Digitalis and those which excite the great sympathetic, particularly the vaso-motor filaments. So that if, in toxical doses, it acts directly on the heart, it seems the therapeutic dose excites primarily the contractility of capillaries, and only influences the heart in a secondary manner in re-establishing the equilibrium of circulation. It calms, he considers, disordered circulation, not as a hyposthenisant, but as an excitant (27). Reith explains in somewhat the same manner its therapeutic value by regarding its physiological action as paralysis of the vaso-motor nerves, and determination of blood to the heart, which implies that there must have been a previous action of excitement of the sympathetic, and spasm of the cardiac vessels (38).

42. Fothergill believes Digitalis acts as a stimulus to cardiac ganglia, this becomes too much for vagi so that instead of an almost synchronous contraction, as is normal, it become distinctly vermicular (18).

43. Hughes thinks that while Digitalis stimulates the nervous supply of the circulation it kills its muscular apparatus. "The latter action is slower than the former, and is for a time masked by it. While pneumogastrics and sympathetic are acting upon the heart, slowing, and at the same time urging, its beat, it is, nevertheless, losing its inherent vigour." After showing how, he adds, "Lastly, the symptoms and post-mortem appearances, which show the heart dying in systole instead of diastole, which are thought to prove the drug a cardiac stimulant to the last, receive their explanation. The heart poisoned by Digitalis is contracted not dilated; but the contraction is the rigor mortis" (20, p. 342).

The evidence is very strong that Digitalis acts powerfully on the vital affinities connected with the cardiac and other muscles, but it has already been shown that the close in dogs and human beings is not a systolic but a diastolic cessation; not a contracted but a flaccid heart.

44. Bearing in mind that there are both accelerating and inhibitory centres in the heart, and in the medulla, it is obvious that great difficulty must exist in determining the cause of any particular variation in the frequency and quality of its beat. These difficulties are further increased when the influence of blood pressure is borne in mind, for this exerts a double action on the cardiac nerves, at one time exciting the heart to increased action, at another causing slowing of its beats.

45. Few of the various theories of action, with the exception of Hughes's, bear sufficiently in view the effects of Digitalis on the affinities of muscular fibre, as shown by Cl. Bernard to be independent of nervous influences (*vide Muscular System*, 54).

Ranvier considers the rhythmic action of the heart is a property of cardiac muscle, as Brown-Séquard has shown in some other muscles, still he deems it necessary to enlist also an excitor and a moderator ganglionic centre, to maintain harmony with the general system (*Arch. de Physiologie*, 1879).

The development of the heart in embryo throws some light on its rhythmic property; when it is a simple dilated tube it begins about the twenty-sixth hour, or perhaps earlier, to manifest rhythmic movements. At this period the most careful microscopic examination discovers no trace of nerve-cells (REYNIER, *Nerfs du Cœur*, 1880, p. 36).

The writer is inclined to consider that the action of Digitalis is manifested principally on the cardiac muscles and their ganglia, and that on these depend the rhythmic action of the heart; it is this influence which Digitalis disturbs, and thus its great power as a regulator of the diseased heart.

46. *Respiration.*—The observations on respiration are as yet imperfect, and Digitalis seems to exercise little or no direct influence on the respiratory system except when the dose is poisonous, then the respira-

tion becomes embarrassed, deep, prolonged, and sighing (*P.* Nos. 2, 5, 7); or again, after moderate doses, when cardiac symptoms have been excited, there is occasionally complaint of oppressed breathing, and sense of constriction of the chest (Exp. 9). These effects are not direct, but due to disturbed cardiac action.

In horses large doses, according to the experiments of Bouley and Reynal, cause acceleration of the respirations and of the pulse, after this excitement there is remarkable diminution, and with intermittence of the heart the breathing becomes intermittent, deep, broken, and trembling. In small doses, given to horses, the action is shown principally in diuresis, then on the circulation, which it very slightly reduces in frequency; the beats of the heart are enfeebled and intermittent; the temperature is reduced (39). Brunton in his experiments on dogs did not notice acceleration, though he admits such may have existed, but he observed in most cases that the respirations became slow, deep, and once distinctly intermittent, coinciding with the beats of the heart (16, p. 34).

47. *Nervous System.*—Some (*e.g.* Von Böeck, 21, p. 716, Fothergill, 18) consider the influence of Digitalis on the brain as inconsiderable, even if all the cerebral phenomena which appear in cases of poisoning may not be traced to disturbance of the circulation. Poisonous doses given to animals excite a condition of coma, insensibility to external impressions, uncertain gait, and even a kind of paralysis of the hind quarters. In men poisonous doses produce confusion of ideas, vertigo, disordered vision, and along with the slow, feeble pulse there are tremblings, convulsions, and coma. The coma and convulsions are regarded as the result of carbonic acid poisoning, following upon paralysis of the heart.

In moderate doses Digitalis has a marked action on motility, shown in the extreme lassitude it produces in men, and rigidity in frogs. Bucheim and Eisenmenger (21, p. 716) and Cl. Bernard (40) have shown by experiments that Digitalis, whether applied directly or acting systemically, altogether destroys the excitability of the muscles. But Bernard's experiments prove that this condition may be entirely due to changes in the muscle itself independent of all nervous influences. Brown-Sèquard has also shown that the power of muscular contraction is not imparted by the action of the great nerve-centres (*Comptes rendus*, May 16th, 1847).

48. *Post-mortem appearances* throw little light on the cerebral action of Digitalis; in a few cases engorgement of the brain is present, in others it is absent. In case No. 6 of poisoning there was marked anæmia in the brain, and this is probably the true condition of brain, until it is masked by the influences of carbonic acid poisoning. There is no evidence that it excites inflammation of the membranes or substance of the brain, but the probabilities are that it induces such a condition of brain as was described by Marshall Hall as hydrocephaloid.

49. Vertigo is frequently excited even by moderate doses, and it is brought on by standing up or by movement.

50. Headache of a dull or cutting character is a very common occurrence after the administration of moderate doses of Digitalis; it is

generally frontal, sometimes occipital, attended often with confusion in the head, and languor, and occasionally persisting for some time after the drug has been disused.

51. After larger doses, there is superadded vertigo, confusion in the head, and disordered vision. This is shown in objects appearing blue or green; sometimes objects seem surrounded with a prismatic halo, sometimes there is dimness of vision, and spots and sparks before the eyes. The pupil is not much or constantly affected, but when so it is generally dilated. These symptoms may be present without pain, or attended by severe pressure and throbbing in the eye.

This disorder of vision arises not only from the systemic use of Digitalis, but occurs after the local application of digitaline to the conjunctiva, when it causes local irritation and congestion which soon pass away, and in four to five hours after this the dyschromatopsy appears.

52. Sleep is generally much disturbed by distressing dreams, painful phantasies, and not unfrequently by palpitation. Sometimes after the use of small doses rest at night is disturbed by excitement of the genital organs. The sleep is unrefreshing, and leaves in the morning a sense of uneasiness with bodily and mental depression. In some few cases the drug acts as a soporific (Exp. 13).

53. Perception is generally dulled, all intellectual labour being difficult; it is a very rare occurrence when there is exaltation of the imagination (Exp. 3), this condition, in Exp. 1, was followed next day by stupor.

54. *Muscular System.*—Experiments on animals show the absolute distinction existing between substances which act on the muscular system and those which affect the nervous system; the muscles obeying more or less the nerves, yet possessing an independent existence and susceptibility to certain stimuli. Digitalis and upas antiar destroy the properties of the muscular fibre, and influence the cardiac muscles before affecting the voluntary muscles; in this respect resembling veratrine (40).

The action of Digitalis on the cardiac muscles has already been discussed (§ 45). Physiological experiments on men (Exp. 1, 10, *P.* No. 5), and numerous observations during its therapeutic use, testify to its marked action on the muscles, as shown in the weakness and sense of fatigue. It lessens the capacity of muscular fibre for work. It does so probably by acting on the energy-generating substance (on the protoplasm of Beale and Drysdale, or inogene of Hermann and others); the changes in this are the source of the power which does muscular work. The repair of the protoplasm or inogene does not keep pace with its expenditure, the muscle for the time becomes acid and can only be stimulated to contraction with difficulty; this condition is exhaustion, fatigue, and resembles the state of rigor.

The action of Digitalis on the uterus is probably more by exciting contraction of the muscular fibres than of the arterioles. The first stage of labour-like pains which it excites have not, to the writer's knowledge, been observed except when menorrhagia is present or the woman is pregnant or has lately been confined. In the normal state

of the uterus, when the muscular fibre is not active, this effect has not been noticed. Bähr has drawn attention, from his own experiments (Exp. 10, also Exp. 7, 12, 14), to the pains resembling those of rheumatism set up in the walls of the thorax and extremities.

55. *Digestive Organs.*—In whichever way Digitalis is introduced into the system, its action on the digestive organs is strongly marked. Frequently the appetite is not affected, very rarely it is increased; in general it is diminished or lost, even to loathing of food. There is bad taste in the mouth, the tongue coated, nausea, desire to vomit, and vomiting of a most severe character as if the stomach were contracting with extreme violence. The matter vomited is generally greenish mixed with bilious or even bloody mucus. There is heartburn, flatulence, and pains in the epigastrium, varying from great uneasiness to severe bruised, burning, and pinching pains. In poisonous doses the violent and frequent vomiting is always attended with severe pain and tenderness in epigastrium, often extending over the abdomen. It is generally attended by diarrhœa, yellow offensive motions, and extreme prostration. In some instances there is constipation attending the vomiting, as also suppression of urine (*Poisoning*, Nos. 6, 6*a*). Salivation is not an unfrequent result.

After moderate doses there is often griping pain as if diarrhœa might come on, the motions, however, remaining normal; there is sometimes pain in descending colon with much flatus. Sometimes after moderate doses, taken for some time, there is pulsation of abdominal aorta, anxiety, and epigastric constriction.

56. *Post-mortem appearances.*—The stomach is inflamed at larger curvature, more so at the pylorus; the duodenum is in the same state. The whole of the intestines are inflamed and partially gangrenous. (*Poisoning*, No. 2). Mucous membrane of stomach and duodenum presented some isolated spots of congestion upon which the capillaries had ruptured, and ecchymoses were found (*Poisoning*, No. 6). Detached patches of inflammation on the serous covering of the stomach (21, p. 718).

57. *Urinary Organs.*—The diuretic properties of Digitalis in health have been questioned, and its properties as such in disease have been disputed, the diuresis which in the latter case often follows its employment in cardiac dropsy being ascribed to improvement in the circulatory organs, and not to a special action on the kidneys.

In Jörg's experiments (Exp. 3, 4, 5, 6), the urine was increased with one exception. In Exp. 1, 7, 8, 9, 10 there is increase. In Exp. 10 there is copious pale urine passed with urgency and excitement of the genital organs; in Exp. 8 the urine is abundant, but the contractility of the bladder is impaired. Bähr, very much from experiments on himself, considers that in moderate doses it diminishes the quantity of urine and increases the specific gravity (15, p. 92). Brunton found, in experiments on himself, that the urine was generally increased to a small extent while he took digitaline in small doses, but not always, while with large doses the pulse fell, the urine increased, its sp. gr. was diminished, the urea was increased, the phosphoric acid and chlorine was diminished (19, p. 42). Pereira considers its diuretic action incon-

stant, but he states it sometimes acts as a diuretic even in health (8, p. 1211). Stillé ranks its diuretic effects as indirect, and doubts Jörg's experiments (23). Winogradoff does not consider it can strictly be called a diuretic. Stadion, after experiments on himself, taking from one to twenty milligrammes during eighteen days, found the urine diminished in quantity (Exp. 12).

In some experiments (Exp. 3, 4), there was increase of urine with frequent desire to pass it, and strangury.

In poisonous doses it causes greater or less suppression of urine, not preceded by any increase (*Poisoning*, Nos. 2, 3), and in No. 5 the suppression lasted for fifty hours, and was followed by a copious flow of urine.

The juice or poultice of leaves or tincture applied to the abdomen will sometimes excite an action of the kidneys when the internal use of the drug fails to stimulate the kidneys.

The effects on the composition of the urine are given in the following form tabulated by Brunton :

Constituent.	*Stadion.*	*Winogradoff.*	*Brunton.*
Water.....	Diminished	No marked increase	Decided increase.
Urea	Less	Less	More.
Phos. ac.....	Less	More	Less.
Chlorine	Less	Less	Less.
Sp. gr.	Less	...	Less.

From the large increase of urea with less work, he believes that when Digitalis acts as a diuretic it increases tissue change ; the diminution of phosphates, he thinks, is due in a great measure to the dislike to, and inability for, any kind of mental work (19, p. 43).

G. Siegmund states that Digitalis has the effect of increasing the flow of urine, while it diminishes the amount of urea by eight grains a day although more nourishment has been absorbed. According to Stadion digitaline produces rapid wasting of the body, and depression of the change of material, and this he regards as its most important action (41).

Von Boeck considers these experiments on tissue changes as not reliable on account of their not having been carried out with the necessary precautions. From a series of his own experiments he concludes that no alteration worth mentioning takes place in the decomposition of albumen under the influence of Digitalis. In doses which augment the blood pressure more urea is found in the excretions, on the other hand, when the pressure is decreased, there is sometimes less urea in proportion to the ingesta (21, p. 717).

58. *Genital Organs.*—In some instances in moderate doses it appears to increase the excitability of the male genital organs (Exp. 3, 5, 9), and in one person to such an extent as to induce him to suspend the experiment for a few days (Exp. 6). It has a very opposite effect in large doses ; if thirty-five to forty centigrammes of Digitalis leaves are taken from five to six days, Brughmann says the most hyposthenising effect

is produced on the generative functions (42). Brunton says "With this conclusion I am disposed to agree" (16, p. 47). In Stadion's experience sexual power is diminished or quite abolished temporarily (Exp. 12). Gouvrat finds: "When Digitalis or digitaline is administered for some time to a man in full possession of sexual power, the latter becomes gradually weakened, the propensities disappear, the secretion of liquor seminis diminishes by degrees, and may at last vanish altogether" (43).

On the uterus it excites bearing-down pains in every respect resembling the first stage of labour. Gouvrat also testifies to its producing strong, regular, intermittent, uterine contractions and pain; he also states it has been used to cause abortion (34). An instance of this result is shown in *Poisoning*, No. 9.

Dickinson first observed its power over the uterus when it was given to a woman with disease of the heart, and who had profuse hæmorrhage. He further demonstrated its power by experimenting on some women a few days after their delivery; when given in ℥j doses of the infusion it set up violent uterine pain. He concludes that its action is on the muscular fibres of the uterus and not on its vessels, and in corroboration of this shows its inefficacy in hæmorrhage from fungoid tumour of the uterus as compared with its marked success in ordinary hæmorrhage (43, p. 9). Legroux quotes Delpech as, after various experiments, finding that Digitalis almost always influenced the uterine contractility (27).

Bibliography.

The list of works now given includes merely those to which reference is made by their numbers in the text of this article; those who desire to consult a full list will find a reference to authorities to 1785 in Withering's treatise; a very full list is given in Bähr's excellent work of monographs and articles in journals down to 1859, and a very complete notice of treatises—but scanty as regards articles in periodical literature—will be found in Dr. Waring's *Bibliotheca Therapeutica*, vol. i, published 1878 by the New Sydenham Society, Lond. A full list is also given in Legroux's thesis.

1. Withering, W., *An Account of the Foxglove and Some of its Medical Uses*, Birmingham, 1785, pp. 207.
2. Hamilton, W., *Observations on the Preparation, Utility, and Administration of the Digitalis Purpurea; including a Sketch of its Medical History*, London, 1807, pp. 214.
3. Sanders, J., *Treatise on Pulmonary Consumption, to which is added an Inquiry proving that the Medicinal Properties of Digitalis are diametrically opposite to what they are believed to be*, Edinburgh, 1808.
4. Hutchinson, W., *On the Physiological Effects of Digitalis*. I have been unable to find a report of these experiments in the English form, I have therefore translated them as given in *Journ. des Progrès des Sciences Médicales*, tom. vi, 1821, p. 218.
5. Hahnemann, S., *Reine Arzneimittellehre*, Dresden, 1825, iii, p. 67. Translation by R. E. Dudgeon, M.D. (from the latest German editions), Lond., 1880, art. "Digitalis," vol. i, p. 551.

6. JÖRG, J. C. G., *Materialien zu einer künftigen Heilmittellehre durch Versuche der Arzneyen an gesunden Menschen*, Leipzsg, 1825, 1te Band, p. 444, 472.
7. BAYLE, A. L. J., *Bibliothèque de Thérapeutique*, tom. iii, p. 1—369, Paris, 1835.
8. PEREIRA, J., *Materia Medica and Therapeutics*, Lond., 1842, p. 1206.
9. CHRISTISON *on Poisons*, 4th edit., 1845, Edin.
10. ORFILA, M., *Traité de Toxicologie*, tom. ii, p. 409, Paris, 1843.
10*a*. TAYLOR, A., *on Poisons in relation to Medical Jurisprudence*, Lond., 1848.
11. HOMOLLE, M., *Mémoire sur la Digitale Pourprée*, Paris, 1872. *La Digitaline au point de vue Clinique, Toxicologique et Médico-legal*, E. HOMOLLE and G. HOMOLLE, Paris, 1872. An abstract of the first papers by HOMOLLE is given in *Dublin Quart. Journ. Med. Science*, 1851, p. 147.
12. SCHRÖN, *Dissertat. de Digitali purpurea*, Munich, 1829; also in *Naturheilprocess und Heilmalhoden*, Hof und Wunsiedel, 1837.
13. BOULEY and REYNAL, *Recueil de Médecine Vétérinaire pratique*, 3e serie, 1849, tom. vi, p. 297.
14. COPLAND'S *Dictionary of Practical Medicine*, vol. iii, p. 356, Lond., 1858.
15. BÄHR, B., Digitalis Purpurea in *ihren physiologischen und therapeutischen Wirkungen, &c.*, Leipzig, 1859.
16. BRUNTON, T. L., *On Digitalis*, London, 1868.
17. TARDIEU, *L'Empoisonnement*, Paris, 1875.
18. FOTHERGILL, J. MILNER, *Digitalis, its Mode of Action and its Use*; being the Hastings Prize Essay for 1870, Lond., 1871.
19. RINGER, Sydney, *Handbook of Therapeutics*, 4th edit., Lond., 1874. Since this monograph was written, this popular work has reached its 9th edition; it contains nothing to change the quotations.
20. HUGHES, R., *Pharmacodynamics*, 4th edit., Lond., 1880.
21. VON BOECK in *Dr. H. von Ziemssen's Cyclop. of Practical Medicine*, English translation, vol. xvii, p. 706, art. Digitalis.
22. CHAPPET, V., *Contribution à l'Étude de la Digitale*, Paris, 1879.
23. STILLÉ, *Therapeutics and Mat. Med.*, 4th edit., Philadelphia, 1874.
24. STILLÉ and MAISCH, *National Dispensatory*, Phil., 1879.
25. WIDAL, "Action of Digitaline," *L'Union Med.*, 1872, p. 113.
26. BROWN, J. D., "External Use of Digitalis in Suppression of Urine," *Med. Times and Gaz.*, 1868, p. 86.
27. LEGROUX, "Action Physiologique de la Digitale," *Gaz. Hebdom.*, 1867, p. 113 (published first as an inaugural Thesis).
28. FOSTER, Balthazar, M.D., *Brit. For. Med.-Chir. Rev.*, 1871, xlviii, p. 214.
29. GERMAIN, M.D., *Gaz. Hebdomadaire*, No. 44, 1860.
30. FAURE, "On Digitaline," *Arch. Gen. de Méd.*, tom. ii, p. 413, 1864.
31. VULPIAN, "De l'action de la digitaline sur les batraciens," *Mem. de la Soc. de Biologie*, 2e serie, ii, p. 67, 1855.
32. "On the Application of Physiological Tests to certain Organic Poisons, especially Digitaline," by HILTON FAGGE, M.D., and THOMAS STEPHENSON, M.D., *Proceedings of the Royal Society*, May, 1865.
33. LOMBARD, Alfred, "Influence of Digitalis on the Temperature, Pulse, Arterial Tension and Respiration,' an Inaugural Thesis, abridged in *Progrès Médical*, and noticed in *Lond. Med. Rec.*, February, 1877, p. 70.
34. GOUVRAT, *Gaz. Méd. de Paris*, 1855, tom. xvii, p. 357.
34*a*. NOTHNAGEL and ROSSBACH, *Materia Medica*, French translation, Paris, 1880, p. 688.
35. EULENBERG, *Allgemeine med. Centralzeitung*, No. 98, 1859. An abstract given in *Sydenham Year-Book*, 1860, p. 64.
36. STANNIUS, "Untersuchungen über die Wirkung der Digitalis, und des Digitalins," *Arch. f. physiol. Heilkunde*, 1851, x Bd., 2 Heft, p. 177.
37. TRAUBE, consulted by writer in various English works, *e.g.* Brunton's—the original sources as given by von Boeck are: *Deutsche Klinik*, No. 8, 1851. *Annalen d. Charité Krankenhaus*, ii. *Jahrg.*, p. 19, 1852. *Berl. klinische Wochenschrift*, 1870, Nos. 18, 19; 1871, Nos. 31, 33.
38. REITH, A., M.D., "On the Action of Dig.," *Edin. Med. Journ.*, 1868, p. 211.
40. BERNARD, Cl., *Leçons sur les Effets des Substances toxiques, &c.*, Paris, 1858.

41. STADION, *Schmidt's Jarhrb.*, vol. 115, p. 287. Extract given in *Year-Book Syd. Soc.*, 1862, p. 158; quoted also in the *North Amer. Journ. Hom.*, where reference is made to Nothnagel, *Mat. Med.*, Berlin, 1870, p. 90.
42. BRUGHMANN, *Rev. Med.-Chir. de Paris*, 1855, tom. xvii, p. 357.
43. DICKINSON, HOWSHIP (Obstetric Assistant at St. George's Hospital), "The Action of Dig. upon the Uterus," *Med.-Chir. Trans.*, vol. 39, 1856.
44. WINOGRADOFF, "On the Influence exercised by Digitalis on the Exchange of Material," *Virchow*, vol. xxii, p. 457. Abstract in *Syd. Yr.-Bk.*, 1862, p. 452.
45. HIRTZ, article in *Nouveau Dict. de Méd. et de Chir.*, t. xi, 1869.

PROVINGS OF DIGITALIS ON HEALTHY PERSONS.

Experiment No. 1, Dr. Hutchinson.

Exp. 1.—On the 2nd of February, at eight o'clock in the morning, I took sixty drops of the alcoholic tincture of Digitalis, which is nearly equivalent to five grains of the powder of the dried leaves (60 drops). At two o'clock in the afternoon there was not any apparent effect; I took sixty drops more (120 drops). At eight o'clock at night I felt a slight heat of the skin and nausea. I experienced the painful feelings of hunger, and there was an increase of the salivary and urinary secretions. The pulse was 90, strong, and full. The medicine had not produced any evident effect upon the heart. The brain did not appear affected. I took sixty drops of the tincture (180) at two o'clock in the morning. I had experienced during the evening a considerable degree of heat at the surface of the body, especially towards the head, nausea and a painful feeling at the stomach, analogous to hunger, although I had taken as much food as usual. My mouth was moist and thick. The quantity of urine excreted was much greater than the quantity of fluid drunk. The pulse was 100, strong and full; the action of the heart was more violent, and was more easily felt internally, and could be seen externally. There was an increase of energy of the intellectual faculties, the imagination particularly was much more active than usual (240).

The 3rd February, at eight o'clock a.m., the night had been very restless. The gentle sleep which I had several times was troubled with dreams, which were remarkable for excessive imagination. I had much thirst, nausea, and uneasiness at the stomach. The urine was very abundant, there was a slight fæcal evacuation. The tongue was covered with a white coat and slightly swollen; the pulse was 120, strong and hard. The action of the heart was strong and somewhat violent. Respirations 26 in the minute, but without any difficulty. The eyes were somewhat red and more sensible than usual to the impression light. I felt a slight pain and fulness in the frontal region. My intellectual faculties had undergone a slight change. I was in a state bordering on drunkenness. I took sixty drops of the tincture of Digitalis (300) the same day at two o'clock p.m. During the next two hours I vomited twice a large quantity of mucus. I felt much nausea, which was accompanied with a painful sensation at the stomach. I had several fluid stools, and after the last vomiting I felt a chill, which was

followed by considerable heat and dryness of the surface of the body, to which succeeded slight pain of the inferior extremities, especially in the calves and knees. I felt somewhat weak; my pulse was 125, strong and wiry. The contractions of the heart were strong and violent, and accompanied with palpitations when I walked in my room. I took sixty drops of the tincture (360).

At eight o'clock p.m. the symptoms were almost the same as those already described; the vomiting and shivering had not reappeared.

I took sixty drops (420) 4th February, eight o'clock p.m. I slept during the night. I again felt great uneasiness at the stomach, and a very violent pain during the vomiting, which recurred frequently and produced an evacuation of a large quantity of mucous matter. I felt besides intestinal pains, and had several bilious stools; my tongue was covered with a yellow coating and considerably swollen, my mouth was full of mucus, my urine was less abundant and of a deep colour; my skin was a little hot, dry, and rough; the abdomen was strongly contracted upon the intestines, and was also very hot, dry, and rough to the touch. I experienced in my legs a feeling of great fatigue, my intellectual faculties were in a state bordering on delirium; my pulse was 150, small, hard, and wiry; the action of the heart was more feeble, and constantly accompanied with palpitations. I stopped the Digitalis.

The 5th February, twelve o'clock.—The last twenty-four hours passed amidst violent suffering, all the symptoms already mentioned were aggravated. I frequently felt shivering, and my strength was extremely weakened; my pulse was 60, small and feeble, but regular; my intellectual faculties were in a state approaching stupor and delirium; one could observe, in a word, all the symptoms of a violent inflammation of the gastro-intestinal mucous membrane, as well as of the brain, resulting from the peculiar effects of the Digitalis. Dr. Cooper attended me on this occasion. Two weeks elapsed before it was possible for me to leave my bed, and nearly two months before my health was re-established.

Experiment No. 2, by Dr. Schrön.

Exp. 2.—Dr. Schrön, long before he had any knowledge of the homœopathic law, published his experiments with Digitalis.

September 2nd.—Early in the morning he took 1 gr. of powdered Digitalis in water. An hour after felt pressure in the stomach, and in the afternoon pain in right frontal region.

September 3rd.—Early he took, fasting, 2 gr., and soon experienced great nausea, confusion in the head, and frontal headache as on the 2nd. Slight pain, apparently in cardiac region, and half an hour after the pulse is softer, smaller, yet quicker. The nausea continued several hours, then came dryness of gums and pharynx. On getting up after sitting giddiness and marked weakness of the legs. Pulsation of heart softer and weaker than usual. Two hours after the giddiness passed away had pressure at the stomach and copious salivation. At noon saw bright sparks before the right eye. In the afternoon unusual perversion of the vision, with anxiety and sense as if finger pressed on the eyeball.

Evening he took 3 gr. The same symptoms occurred, but there was now much greater dryness of the mouth and pharynx, with thirst so great that he had frequently to drink during the night. Pressive pain in eyeballs with dilatation of pupils, especially the right.

September 4th to 7th.—He took daily half a grain morning, noon, and evening. Scarcely any of the former symptoms were experienced, but he felt considerable disturbance of the circulatory organs, so much so that on the night of the third and fourth day he had, on account of heart palpitation and anxiety, to get out of bed, to walk about, and open the window. The pulse was 100 and strong. Head congestion, with rushing and tinkling sounds in the ears, lasted several days. Palpitation of heart less severe on the night of the 5th, frightening him out of sleep. No action was experienced on the urinary or genital organs. This observation is quoted by Wibmer (*Wirkung der Arzneimittel und Gifte*, ii, p. 311), but he gives the name as Shroek, an error repeated by Pereira (p. 1211). *Vide Bähr.*

Experiment No. 3, by Dr. Jörg.

Exp. 3.—Dr. Jörg, aged 45, middle sized, constitution robust, temperament sanguineous choleric, took 19th August, 8 a.m., ¼ gr. of powdered Digitalis with sugar and water. An hour after he felt his head affected, also pressure over occipital region, which continued at intervals till noon; at the same time he observed that he saw objects in a false light. From 10—11 he felt increased motion in the digestive canal, this passed into slight griping pains in the bowels, extending from hypogastrium to the testicles. At 11 a.m. the pain disappeared, but a desire to urinate, with itching excitement of the glans penis, continued until the afternoon.

August 20th.—Took at 8 a.m. ½ grain Digitalis; he soon experienced scraping in the throat with hoarseness, the former soon disappeared, the latter continued all day. At 9 felt headache as on 19th, but more severe; it disappeared at 12, but recurred several times in the afternoon. From 10—11 borborygmi and griping pains which lasted an hour; the urine passed in greater quantities than natural, without pain, but with peculiar irritation of the glans penis as on 19th. This continued until noon of 21st; appetite and pulse not affected.

August 22nd, 8 a.m.—Took ¾ gr. of Digitalis and 3 grs. of magnesia in half an ounce of water. Experienced rawness in œsophagus and windpipe, griping pains and desire to go to stool. At 10 a.m. had a motion which contained fæcal matter. From 9 a.m. the affection of the head commenced which Dr. Jörg compares to a spiritual intoxication, describing it as an apparent expansion of the nervous life beyond the usual limits. This state of mind passed away without leaving any headache. In the afternoon flatulence, heartburn, and sensation as if the throat were compressed by enlarged tonsils. Until the morning of the 23rd there was much and even painful excitement of the genital organs; after this excitement ceased the urine flowed abundantly.

August 23rd.—Took 1 gr. Digitalis in half ounce of water; he experienced much the same symptoms as on 22nd, relaxation and weakness

bodily and mental. At 11 a.m. headache at vertex lasting an hour; 11—3 sharp burning and scratching in œsophagus. The appetite was unaffected throughout the whole proving. On the 22nd and 23rd the pulse was smaller and weaker, never slower, but occasionally quicker than usual (6, p. 462).

Experiment No. 4, Frau Ch., under Dr. Jörg's observation.

Exp. 4.—Frau Ch., aged 45, short, slender frame, but healthy and of sanguineous temperament. On the 18th of August, 8 a.m., took ¼ grain of Digitalis, with 4 grains of sugar. Shortly after felt a pain in the hypogastrium, lasting half an hour, followed by more or less heat in the stomach, and extending to the œsophagus. This continued till the evening.

August 20th, 8 a.m.—Took half a grain of Digitalis with 7 grains of sugar in half an ounce of water, and shortly after experienced a scraping in the œsophagus. A quarter of an hour after felt slight cutting pains in the stomach, and from 9 o'clock slight affection of the head with pressive headache. At 10 o'clock desire to make water, which was not relieved by micturition. In the afternoon suffered from pressive pain over the crown and back part of the head; also from a sharp burning pain extending from the stomach to the throat; the secretion of urine increased until bedtime.

August 21st.—After a restless night, had headache, as on the 20th, but less severe; the desire to micturate ceased at 3 p.m., and the increased secretion of urine was much diminished by the evening. The burning in the stomach lasted until the evening.

August 22nd, 8 a.m.—Repeated the dose, as on the 20th, with the addition of 1½ grains of magnesia. She soon experienced slight headache, griping in the abdomen, followed by increased warmth of the whole body; desire to urinate. From 10 to 11, pain in the region of the kidneys; the urine increased to such a degree that she passed every two hours more than she usually did in twenty-four; no increase of thirst. The headache disappeared on the 23rd; the increased secretion of urine continued until the evening of the 24th, and was very troublesome, especially at night. Besides these symptoms, she felt weak and exhausted. From the 22nd to the 24th the vision was weak and dim; the pulse kept small, weak, and a little quicker than usual (6).

Experiment No. 5, Carl Otto, pupil of Dr. Jörg's.

Exp. 5.—Carl Otto, aged 22, tall, slender, and of a lymphatic constitution, took from the 11th to the 14th various doses of Digitalis leaves, from ½ to 1½ grains, but as it was mixed with as much as 5 grains of magnesia, the results are now omitted, and the symptoms are reported from the 15th August, when at 11 a.m. he took 2 gr. of Digitalis in half an ounce of water, feeling soon a scratching in the pharynx. Towards noon he experienced a confusion in the head, this became more and more a pressive pain, which from the vertex extended over the whole head, passing away, feeling the peculiar sensation in the eyes he had experienced after the previous doses, the sight suddenly

confused as when one passes from darkness into a bright light, then as if sparks were floating in the air; these symptoms and attending giddiness did not last above a quarter of an hour. There was slight increase of the urine, and for half an hour great excitement of the genital organs. The pulse small and slow.

The prover slept well, but woke on the morning of the 16th with the same headache, increasing during the whole day. Otto had not before or since suffered from a similar headache. The pulse was weak, soft, varying frequently in tension; the urine became much diminished. On the night of the 17th he again slept well, and the headache of the previous day was nearly gone.

August 17th, 8 a.m.—He took 2 gr. of Digitalis leaves in half an ounce of water, soon after he felt scratching in the pharynx, lasting a quarter of an hour; an hour later the confused feeling in head, affecting thought, and passing into the formerly reported pressive headache. Diminution of the pulse and excitement of the kidneys and genitals as on the 15th. The appetite was slightly diminished. Slept well on the nights of the 17th and 18th, but he woke with the same headache as before. This headache continued throughout the day so severe that the prover was unable for any work, and obliged to go early to bed. The pulse was very weak, with varying tension (6).

Experiment No. 6, *Siebenhaar, under Dr. Jörg's observation.*

Exp. 6.—Siebenhaar, aged 22, middle-sized, constitution robust, temperament melancholic, on the 9th August, 8 a.m., took ½ gr. of powdered Digitalis mixed with 3 gr. of magnesia in ½ oz. of water, and on the 10th at the same hour took ¾ gr. of Digitalis in the same mixture. He experienced burning and scraping in the pharynx, followed at 8.30 by giddiness, sparkling before the eyes, double vision, and acceleration of the pulse. These symptoms entirely disappeared in half an hour.

August 11th.—Took 1 gr. of Digitalis with 3 gr. of magnesia. The scraping in the throat was a constant symptom; sparks before the eyes and giddiness appeared about 8.30, and disappeared in half an hour. The pulse was a little quicker than usual, but after the effects of the medicine had passed away it became slower and smaller. The genital organs were much excited; no increase of urine.

13th, 8 a.m.—Took 1½ gr. with magnesia as before. He immediately experienced scraping in the œsophagus, dizziness, and sparks before the eyes, which did not last long; but the irritation of the genital organs was so very troublesome, as to induce him to suspend the medicine for a few days.

17th, 8 a.m.—Took 1½ gr. Digitalis, but without magnesia; it tasted more bitter than before, and produced scraping and burning in the pharynx; pulse and digestive organs not affected; urine normal, genital organs much excited.

18th, 8 a.m.—Took 2 gr. Dig. in ½ oz. of water. The same symptoms were experienced as on the 17th; towards the afternoon the secretion of urine was increased.

19th.—Took 2½ gr. The same symptoms appeared as on the 18th and disappeared by the afternoon.

20th, 8 a.m.—Took 3 gr.; symptoms as on 18th. By 10 a.m. the secretion of urine was increased and forced him to pass water every two hours, and twice during the night. The genital organs were much affected, the pulse remained unaffected (6).

Experiment No. 7, by Dr. Black.

Exp. 7.—Commenced 21st October, 1845, to prove the tincture of Digitalis on himself; the pulse averaging in the forenoon when sitting 68, and in the evening 75. At 10 p.m., after sitting quietly for an hour, felt my pulse, which was 68, took 10 gtt. tinct. Digitalis; continued to sit quietly reading. In half an hour, felt a dull frontal headache; pulse 68. The headache continued to increase; on going to bed felt momentary nausea.

October 22nd.—While dressing, took 10 gtt., sat down shortly after, and in twenty minutes (nine o'clock) felt my pulse, which was 66; no headache. At eleven o'clock pulse 76, of natural strength; after walking slowly four or five times up and down my room, pulse 83; experienced uneasy sensation across chest to left side. Two p.m., pulse 75; took 10 gtt.; dull, disagreeable sensation in region of heart. Half past two, pulse 80; feeling of slight confusion in the head, especially on moving, with painful sensation of weakness in the wrists and forearms. Three o'clock the pulse was felt by a medical friend, it was now 76, counted several times, it gave the first half minute 36, the second 40, and three beats failed to be felt. Eleven o'clock, have all the evening been feeling dull, uneasiness in various parts of the head, with sensation of weakness in the forearms; pulse 80; bowels moved naturally in the morning, and again at nine in the evening. Twelve o'clock, pulse 78, but weak, beating strong from 12 to 20 times, and then very weak for 4 to 5 times.

October 23rd.—Passed a restless night, starting often in my sleep; weakened feeling, great lassitude and depression; pulse while lying in bed 62, small and weak; on getting up, the depression and languor increased; occasional faintness, which, on moving, was attended with nausea; appetite good; pulse in the evening 72; felt very well.

October 24th.—Slept well and experienced no symptoms. Eleven o'clock a.m., pulse 80, full and regular; took 20 gtt. Quarter to twelve, pulse 90, weak; three or four pulsations in the minute hardly felt. Throughout the day experienced uneasiness in the mammary regions, especially left, and extending to the left shoulder and upper part of arm; frequent griping pains in the bowels; palpitations of heart easily excited on going up even a slight ascent, which in health would produce no effect. Eleven p.m., pulse 82, nearly natural strength, but not steadily so.

October 25th.—Slept well; wakened with dull frontal headache and nausea. Half past eleven a.m., pulse 76, took 25 gtt. At twelve o'clock, pulse 84; frequent griping pains in the bowels, and uneasiness at the heart. In the evening, pulse 76, rather weak.

October 26th.—With the exception of slight uneasiness in the region of the heart, experienced no symptoms. Towards the evening, seized with very violent colicky pains, immediately followed by a sudden evacuation of liquid stools.

October 27th.—Half past ten a.m., pulse 72; took 30 drops. Half past eleven, pulse 88, irregular. Half past twelve, pulse 84, less irregular. Three o'clock, pulse 72, regular. Throughout the day experienced dull frontal headache, with frequent uneasiness in the region of the heart.

October 28th.—Half past 10 p.m., pulse 72, regular, have felt well all day; towards the evening experienced a dull, disagreeable pressure outwards in the chest and epigastrium, relieved by beating on the chest. This lasted three hours.

October 29th.—In the morning, pulse 73; dull frontal headache, increased much by movement.

October 30th.—Half past six p.m., pulse 78.

November 4th.—Having been much occupied, and suffering from the Digitalis, I suspended the medicine until to-day. Eleven o'clock a.m., pulse 73, natural; took 25 drops. Half past twelve, pulse 80; two o'clock, pulse 76; four o'clock, pulse 62. Suffered much after dinner from severe bruised pain in the epigastrium and over sternum, with feeling of languor and indigestion, going off after a little weak tea. Throughout the day, frequent uneasiness, amounting sometimes to pain, in region of heart; occasional nausea; seldom free of dull frontal headache; feeling of great fulness in the ears, as if they were suddenly stopped, attended with a flush of heat over the face, lasting two or three minutes, recurring frequently, especially after excitement. Before going to bed took 15 drops.

November 5th.—In the morning pulse 72. During the early part of the evening of the 4th suffered from pains, now to be reported as being felt more on the 5th. Bruised pain in the nape of neck, between the shoulders, and extending forwards over anterior part of chest, where the flesh was painful when pressed, especially over the sternum. These were attended with dull frontal headache, bruised pain in the epigastrium, with feeling of distension in stomach. Appetite good. After dinner dull pain and distension of stomach, felt as if I had eaten too much. In the evening the bruised feeling over the sternum and epigastrium was very distressing, preventing any mental enjoyment.

November 6th.—Passed a wakeful night, suffering from palpitation of heart and uneasiness, especially when lying on left side, together with pulsations in the ear, especially the left. Eleven o'clock a.m., after walking, pulse 75, a little irregular; took thirty-six drops. At twelve pulse 84; at half past twelve 86, slightly irregular; palpitation and uneasy feeling at heart, readily excited even by moderate exercise. In the evening took twenty drops; shortly after suffered from frontal headache, with pressure on the temples; pulse 100, irregular, but full; increase of bruised pain in epigastrium.

November 10th.—Since the 6th I have not taken Digitalis, as I continued to suffer much from uneasiness in the heart, headache, and disorder of the stomach; the pulse was normal but easily excited. I still suffer from bruised feeling and weight in epigastrium with flatulence,

These symptoms continued until about the 14th. During all the time of the experiment the condition of bowels, genital organs, and urine was not sensibly affected.

Experiment 7 a.—Two showing the small influence of Digitalis on some persons.

Exp. 7 *a.*—George Lippert, aged 23, of middle stature, florid, sanguineous temperament, took from the 11th to the 23rd August in all thirty-two grains of Digitalis leaves; the doses varied from half a grain to ten grains, but no symptoms were obtained. The powdered Digitalis leaves were from the same specimen employed by Jörg for the other provers (6).

K—, aged 22, of a bilious temperament and average health, took under Dr. Black's directions tincture of Digitalis. He began by taking ten drops twice a day, then fifteen twice a day, then twenty, increasing it by ten drops until the dose reached sixty drops twice a day. No effect on the pulse was noticed, the only possible symptom being the urine assuming a brownish colour, and a heavy disagreeable smell: with this exception K— felt remarkably well.

Experiments 8, 8 *a*, 8 *b*, 8 *c, by Homolle and Quevenne.*

Exp. 8.—Homolle and Quevenne experimented on themselves with full medicinal doses of Digitalis and digitaline at different intervals during 1842, 1843, 1848, and 1850, and give as the average results on circulatory organs a slight retardation of pulse, in a few experiments first acceleration then retardation, the latter more marked whenever the system is fully under the influence of the drug, and attended by irregularity and intermittence. The following experiments illustrate the general action of the drug:

Exp. 8.—The prover's pulse for an average of eighteen days' observation was 68, the maximum 73, the minimum 62. Eight doses of powdered Digitalis were taken, during the first three days of twenty centigrammes, and on the following of thirty centigrammes. During this time the average pulse was 65·06, the maximum 70, the minimum 63. On the last two days of taking these doses he experienced on the first pain in the stomach and disordered digestion, without any real nausea; on the second there was on standing up vomiting of yellow slimy mucus, great prostration, which obliged him to lie down, and more vomiting. During the ten following days, though no more Digitalis was taken, he felt considerable intoxication, the sight was disordered, and the pupils dilated; no decided headache; the pulse was average 60·32, the maximum 72, the minimum 53. For the first five days the stomach was so irritable that all food was vomited. The urine was much diminished.

Twenty-four days after this sense of intoxication ceased the pulse was slow, the average being 63, the maximum 72, the minimum 55.

Exp. 8 *a.*—Homolle, after taking about seven and a half grains of the substance taken up by ether from an alcoholic solution of Digitalis,

had no vomiting for eight hours; he was then seized with great nausea, faintness, and vomiting, which continued at intervals of fifteen minutes for thirty hours. Next day his pulse had fallen, and on the fourth day was as low as 48. Vision was impaired, and he could not look steadily at a bright object. Urine was abundant, but the bladder's contractility was impaired, and external pressure was required to expel the urine. He had pulsation of the abdominal aorta, anxiety, epigastric constriction, and cough with pneumonic expectoration lasting for a week, but these, he thought, were caused by the continuous vomiting.

Exp. 8 *b.*—Homolle, in good health, with an average pulse of 64, having on the previous evening blistered a small surface on the inside of left arm, applied at eleven a.m. over this abraded spot one centigramme of the bitter principle of Digitalis. 12 o'clock, dazzlings, painful numbness of the arms, slight headache, pulse 64. 2.30 p.m., continued headache, yawnings, general muscular weakness, pulse 70. At 5 p.m. the headache had disappeared, dined with appetite. 7 p.m., pulse 72, regular, bowels moved. 9 p.m., the raw surface looks irritable; another centigramme applied. 10 p.m., pulse 60, less regular, and now and then intermittent; headache, dazzlings, muscular weakness, slept well.

13th July, 7 a.m.—Pulse 64, the abraded surface on arm covered with a little mucous pus; two more centigrammes applied. 8 a.m., pulse 64 to 68, slight headache, and fleeting dazzlings; the same kind of symptoms continued until evening, the urine diminished, but the appetite good; at 8 the pulse varied from 68 to 72, soft, very irregular as to force and rhythm, intermitting once in about 30 beats, then about every fifth beat one very feeble; slight shivering. At 10 p.m., the pulse 57, very irregular, the sleep very agitated and often interrupted; a painful and unusual sense of heat in the hands and feet.

July 14th, 8 a.m.—Pulse 68, regular; again applied 2 centigrammes. 11 a.m., headache, dazzlings, vision slightly disturbed, pulse 60, appetite good; at 2 p.m., pulse 60, irregular and intermittent, the arm very painful. At 6 p.m., after dinner, return of headache, dazzlings, great sense of fatigue. At 8.30 p.m., pulse 60, unequal, irregular, intermittent; great fatigue; lumbago, not to be accounted for by day's occupation; urine scanty, and bowels costive; great feebleness as after violent emotion or syncope. The pain and swelling of arm obliged discontinuance of experiments. He thought the appetite was rather increased during the experiment.

Exp. 8 *c.*—Homolle, July 28th, 1841, the pulse varying from 64 to 72, took at 8 a.m. 5 milligrammes of the bitter principle; no appreciable effect up to 2 a.m. when five more were taken. At 5 p.m. the appetite good, slight feeling of fainting. Throughout the day the pulse varied from 60 down to 50 and then rising again to 56; there was frontal headache, dazzlings, loss of appetite, sinking at the epigastrium, intestinal flatulence, borborygmi, flatulent eructations, slight abdominal pains, urine abundant, great fatigue, painful heat in the evening, but no thirst. No more digitaline taken.

July 31st.—Sleepless night; 6 a.m. pulse at rest 54, moving raises it at once to 66, falling immediately to 54 when at rest. Throughout

this day and next the frontal headache, yawnings, dazzling of sight, disorder of stomach continued. The urine was abundant and passed with heat. As the pulse lowered it became irregular and intermittent; for two days after the drug was discontinued the pulse continued lowered, and then gradually regained its normal frequency and rhythm (11, ii, p. 25).

Experiment No. 9, Dr. Bähr.

Exp. 9.—Dr. Bähr's experiments on himself lasted from the 27th February to 17th May, 1857; during this time the weather was very changeable, in February and March unusually mild and dry, in April and to commencement of May dry and inclement, but during the last days of the experiment fine and warm. During the winter up to May he suffered from catarrh of nose and fauces, but no cough. The experiment was directed principally towards the action of Digitalis on the heart and kidneys; he took special care to ascertain the average action of those organs for several days and five times a day.

Quantity of urine was, maximum 1265 c.c., minimum 875 c.c.; average in the day 1075 c.c.

The pulse is habitually regular, full and strong. The average in the morning was, in bed 56, on sitting 61, on standing 66; the pulsations of the heart are scarcely felt. The diet was carefully regulated, and maintained the same by weight before and during the experiment.

February 26th.—Took Tinct. Dig. gtt. x, then the occurrence of acute rheumatic pains in the right shoulder after exposure to cold delayed the experiments until March 3rd, when he took in the evening 10 drops, the pulse then being 60.

March 4th.—Pulse in bed 58, in the evening sitting 62; took 10 drops.

March 5th.—During the night had seminal emissions, which had not occurred for a year; pulse in bed 54.

March 10th, 11th, and 12th.—On each day 18 drops were taken.

On the 13th and 14th no doses were taken, the urine 900 c.c., sp. gr. 1025, and depositing a thick white sediment.

On March 19th, the experiment was resumed with ½ gr. of powdered Digitalis leaves, the pulse being 57. In half an hour 54, and in an hour 51, in the evening 66. Urine 1150 c.c., sp. gr. 1023; emissions during the night.

March 20th, 10 a.m.—Pulse 59. 10.30, took ½ gr. Dig. 1 a.m., a sudden severe tearing cutting pain in right frontal region from the eyebrow upwards, lasting a short time, but returning quickly three different times.

Afternoon, 3½ hours after dinner, a sensation as if the food were rising up in the œsophagus, but no nausea. 11 p.m., pulse 58, urine 870 c.c., sp. gr. 1023.

March 21st.—Passed a restless night. 10.30 a.m., took 1 gr. Dig. 11 a.m., pulse 58, urine 1145 c.c., sp. gr. 1017.

22nd.—Took 1 gr., urine 975 c.c., sp. gr. 1025.

23rd.—Took 1 gr., urine 1100 c.c., sp. gr. 1018.

24th, 10.30 a.m.—1 gr. powder; after dinner felt a sudden feeling

as if heart stood still, with sense of anxiety and need to hold the breath, lasting about a minute. Urine 1200 c.c., sp. gr. 1024.

25th.—No dose; 10 a m. pulse sitting 68, standing 81, recumbent 62; distinctly irregular, three to four quicker and smaller pulses, then slower, stronger and fuller. During the whole day felt irritable and out of humour, whereas in general he was cheerful. Appetite diminished. Afternoon, the same pain as on 25th; but not so severe. In the evening while going slowly felt a quick pulsating pain in the region of right nipple, lasting a minute, attended with a taking away of the breath, with anxiety. Sleepless restless night, about 1 a.m. severe palpitation of the heart with rapid pulse; urine 825 c.c., sp. gr. 1026. No doses after this.

26th.—Urine 1110 c.c., sp. gr. 1026.

27th.—Urine 1105 c.c., sp. gr. 1026. Towards the end of March severe nasal catarrh, and during four consecutive nights seminal emissions with strong erections, before rising and on getting up (a very unusual circumstance with the prover).

April 22nd., 10 a.m.—Took 1½ grs. Dig. powder; the pulse before taking 59 sitting, standing 61; three hours after dinner pulse 73 sitting, 78 standing. 11 p.m.—Pulse 82 sitting, 94 standing; took after this another grain of Dig. Wakened towards 3 a.m. with desire to pass water, which was passed in trifling quantities.

April 23rd.—Pulse in bed 59. Coffee and bread taste bitter. 9 a.m.—Pulse 72 sitting, 79 standing. Feels the pulse much quickened when he walks; after sitting an hour, pulse 66 sitting, standing 85; while in the former position it is full and irregular, in the latter it is small, weak, and irregular. 10.30 a.m.—1½ gr. Dig.; in an hour slight giddiness with a difficulty of fixing the eyes on an object. Sense of emptiness in stomach; noon, pulse 65 sitting, 81 standing; with the same character as in the forenoon. 11 p.m.—Pulse 68 sitting, 84 standing, and irregular as before. Urine 1430 c.c., sp. gr. 1030.

April 24th, 11 a.m..—Pulse 60 sitting, 72 standing, very slight movement increases the frequency and weakness of pulse. Urine 950 c.c., sp. gr. 1022.

April 25th.—Seminal emissions towards 1 a.m.—following night, unusual erections.

May 5th, 10 a.m.—Resumed taking Dig. 1½ grs.; previous to this pulse 61 sitting, 68 standing. 11 a.m.—Squeezing pressure on the stomach, later while visiting a patient sense of giddiness as if he might swoon away. 6 p.m.—Pulse 68 sitting, 85 standing, again giddiness and faintness.

May 6th, 9 a.m.—Pulse 69 sitting, 75 standing. 7 p.m.—Pulse 67, 75 standing; no other symptoms noticed. Urine 1460 c.c., sp. gr. 1018.

May 8th, 10 a.m.—Took 30 gtt. Tr. Dig.; little variation in the pulse during the day. 10 a.m.—Pulse 70 sitting, 82 standing. A similar report and dose may be given to May 9th.

May 10th.—Pulse in bed 70. After passing a much diminished quantity of water, sp. gr. 1031, felt pressure in the bladder, and burning in urethra lasting half an hour. The complexion so bad as to

attract attention. On getting up in the morning, continued erections, more marked than on the 8th, and becoming painful and unpleasant. In the evening in bed a throbbing toothache in left lower incisors lasting half an hour; the prover's teeth are sound, and he never suffers from toothache. Wakens at night with painful erections like chordee, the sleep very restless, disturbed by dreams.

May 15th.—Took 2½ grs.: the night again restless, with a return of the toothache of the 10th, but not so severe. The sp. gr. of urine in the morning was 1033, the quantity during the day c.c. 1050, reaction neutral, the average sp. gr. 1026. During all the proving there was rather a tendency to costiveness, which is unusual with the prover.

On the 18th motions became natural; he complained all day of troublesome dyspnœa, which had been observed in a slighter degree on the 14th and 17th, but to-day felt more urgent, increasing towards the evening; sense as if the clothes over chest were too tight. Pulse, 11 p.m., 82 sitting, 90 standing, small, weak, and somewhat irregular. The heart beat is strong, and much more perceptible than usual. No observations regarding urine taken.

May 19th.—The erections towards the morning had ceased for some days. Pulse 58 sitting. The dyspnœa shown lately in a less degree, but is accompanied by a sense of uneasiness and exhaustion in the chest, and repeated dry cough. Afternoon dyspnœa increases, not worse in the evening than during previous night, worse on writing. Pulse, 7 p.m., 74 sitting, 86 standing, rising soon to 94, but without any noticeable irregularity it gradually became slower.

May 20th, 9.30 a.m.—Pulse 52 sitting, 60 standing, full and regular. The sense of oppressed breathing continued, weak in the morning, increased in the afternoon and evening; some palpitation of heart.

All night deep under right mammary region a drawing pressive pain prevented him a long time from going to sleep; restless night. The sense of oppressed breathing continued in a less degree throughout May, and did not entirely cease until the commencement of June.

Experiment No. 10, with Digitaline, by Bähr.

Exp. 10.—Another experiment made by Bähr on himself to ascertain the action of digitaline gives results so analogous to those arising from Digitalis that it is unnecessary to give them in detail. He was in good health except a chronic catarrh of nose and fauces. The character of the pulse was regular, not very full, and not soft; the pulsations of heart not readily felt, except on decided movement.

The digitaline was prepared by Tromsdorf in Erfurt, and taken triturated with sugar of milk, so that half a grain of this trituration (the 2nd dec.) was equal to ½ of a milligramme of digitaline, two grains to 1½ milligramme, and three grains to 1½ milligramme.

He commenced on 14th May by taking ½ of a grain. Slight confusion in the head and rise in the pulse to 86, falling in the evening to 71.

May 15th.—Took same dose. Increase of nasal catarrh.

May 16th, 10.25 a.m.—Pulse 60. Took ½ grain. An hour after, fleeting pulsating pain in cardiac region; afterwards sensation as if heart stood still, followed by much palpitation. Pulse, 10 p.m., 80 sitting, 96 standing.

May 17th.—Took same dose 9.30 a.m., pulse sitting 74, standing 84; 10.30, 69 sitting, 78 standing; 5.30 p.m., 80 sitting; 11 p.m., 80 sitting; pulse unequal. Frequent recurrecne of pressive pain in cardiac region, lasting a short time. Colicky pains as if diarrhœa might come on. About an hour after dinner grinding pains in the stomach relieved for the time by eructation and discharge of offensive flatus. In the afternoon long continued sense of pressure on chest with sensation as if heart stood still; dull cutting pains in abdomen. Sleep sound, seminal emission occurring without waking him.

May 18th.—Dose increased to ½ grain. Pulse 70; 10.30, 72 sitting, 87 standing; 12.10, 68 sitting; 3.20 p.m., before eating, 86 sitting; 11 p.m., 84 sitting. In the forenoon a throbbing drawing pain in region of left tensor fasciæ latæ, lasting an hour, increased by pressure.

May 19th.—One grain taken at 10.45, pulse being 70 sitting, 78 standing; 11, pulse 64; 9 p.m., 78 sitting. The sleep of two previous nights disturbed by dreams, an unusual circumstance with prover. The pulse rapidly increased by movement.

May 20th, 21st, 22nd.—No medicine. On the latter day he experienced sudden rheumatic pains in left side of nape of neck and left arm, hindering movement (but it is doubtful if these pains can be attributed to medicine, as Bähr caught cold at this time).

June 1st.—The nasal catarrh had much diminished when the proving was resumed by taking ½ grain, pulse being 60 sitting, 68 standing. It remained much the same all day; 6.30 p.m., 82 sitting. During the day sense of great weakness in the limbs. In the evening in bed, lying on left side, three or four violent palpitations in succession, immediately ceasing on turning to the right side. During this time the pulse was slow and full, with pulsations in head like a hammer; afterwards the pulse became quicker and smaller.

June 2nd and 3rd.—Nothing to report.

June 3rd, 10 a.m.—Took 2 grains. Pulse, sitting 65, standing 73; in half an hour, while reclining 65, on standing up 97, then 89, 84, and then on lying down 62. In the evening stitches in cardiac region, with palpitation. No medicine next two days.

June 7th.—Took 2½ grains. Return of oppression of breathing, and after long restlessness cutting pain in right breast. The appetite normal; tongue clean. Pulse not affected.

June 2nd.—Took 2 grains. The rheumatic pain in both breasts more acute, with slight oppression of breathing. Nasal catarrh again increased, and urine diminished. [Subject to chronic nasal catarrh.]

June 9th.—Took 2½ grains. Ten minutes after felt confusion of sight and head, which increased in forehead, with throbbing pain in occiput, relieved by going into the open air; legs weak and trembling. 4 p.m.—Sudden throbbing tearing pain in right elbow, extending from external condyle upwards, very violent for a time, and then decreasing; oppression at chest; urine diminished. An increase of nasal catarrh

here occurs, so reports are omitted until June 15th. 10 a.m.—Pulse 68 sitting, 82 standing. Took 2 grains. 10.50.—Pulse 72 sitting, 82 standing. After this pulse unaffected. Soon after taking the dose felt weak and faint sitting or standing; also frequent recurring attacks of pinching pains in stomach and abdomen as if diarrhœa might come, but motion is natural. In half an hour general malaise, with trembling and weakness of the legs. In the afternoon throbbing pain in left shoulder-joint on walking; arm feels weak. After dinner shooting in epigastrium; at the same time throbbing shooting pain in middle joint of right index-finger.

June 16th.—Took 2 grains. Much the same as on 15th. In the evening on lying in bed on left side violent shooting throbbing pain in left side between nipple and axilla. Pulse, sitting 68, standing 90, very unequal.

June 18th.—Took at 10.30 2 grains. In five minutes, pulse rose from 66 sitting to 78, falling in ten minutes to 66, at which it remained. Sense of powerlessness in legs, with tearing pain in ankles, also throbbing pain in right side of chest. Griping pain, but no diarrhœa; in the evening return of oppressed breathing; night very restless.

June 19th.—Took 3 grains. Symptoms as on 18th, with throbbing frontal headache; severe pains both sides of chest. At noon on walking severe dull stitches in cardiac region; great weakness, and dislike to professional visits. In the evening more severe palpitation of heart than he has yet experienced. The right pupil somewhat larger than the left.

June 21st, 10.30 a.m.—Took 3 grains, and at 10.30 p.m. 1 grain. No marked effect on pulse. On leaving bed griping pain in abdomen, with frequent passing of flatus, then diarrhœa. Soon after first dose, while sitting, giddiness and confused vision; weakness of legs and trembling of hands, rendering writing difficult. Urine in the morning very abundant, though he had drunk very little on the previous evening. After evening dose return of confusion in head, with shooting frontal headache. Pains in abdomen as if diarrhœa was coming on; pains as before in chest and left shoulder-joint.

June 22nd.—No medicine. Night very restless. During the day abdominal pains, as if diarrhœa was coming on. In the evening squeezing pains, with offensive pappy stools.

June 23rd.—The experiment was carried on from this date until the 28th in 3 grain doses from once to twice a day. The symptoms were much the same as have been reported; the most prominent were violent palpitations of the heart when lying on left side, shortness of breath, sense of oppression at chest, with increase of pain in both sides of thorax. Severe throbbing pain in right pectoral muscle, increased by pressure. Great weakness, with ebullition of blood and vertigo.

On the 24th he complained of violent shootings through the right eye, lasting some minutes; a little later violent cramp-like drawing pains from toes through left leg, with pain in forehead, shivering, and pinching pain in bowels. No more digitaline was taken after the 27th, but after this date the nights were restless and disturbed by diuresis

and erections, long-continued throbbing tearing extending upwards from inner condyle to right thigh.

On the 6th July an acute, smart attack of coryza, which he attributes to digitaline, as it was different to his ordinary attacks; he complained of dull pain in the arms until July 13th.

Experiment 11, *by Purkinje.*

Purkinje says:—I took daily 3 grains of the watery extract of Digitalis for four successive days. No effect on the general system, but on the second day I noticed before the eye a very faint glimmering. It was just as if the crystalline lens was put into vibration with each movement of the eye, and with the altered refraction a transitory appearance of light and dark spots in objects was produced. On the third day glimmering was more marked, on following day observed in right eye also. After a large dose of Digitalis the glimmering again appeared in the left eye some hours before the right was affected.

The appearance and disappearance of internal movement in the figures of the eye is best compared to the undulations seen in a broad vessel of water, the surface of which at one or more points has been put in motion. Besides this, on closing the eyes and gently rubbing them I could produce a tremulous phosphorescence.—(*Neue Beiträge zur Kentniss des Sehens in subjectiver Hinsicht. Berlin*, 1825. *S.* 120—128.)

Experiment No. 12, *by Stadion, with Digitaline.*

Stadion, after a series of observations to determine the effects of a uniformly weighed quantity of milk, eggs, bread and butter on his urine, commenced experiments with digitaline, following the same diet.

He commenced his experiments by taking 2 milligrammes, about $\frac{1}{37}$ grain. The next day the dose was increased to 3 milligrammes, and so on to 18th day, increasing the dose for eighteen days daily by 1 milligramme. On 1st day he experienced a dull indistinct transient cutting pain in cardiac region and in left hip-joint. By 6th day nausea was added; up to the 12th appetite, nausea, anorexia and muscular debility steadily increased; felt severe articular pains like rheumatic, and finally coryza. From the 14th rapidly increasing emaciation, dirty greyish colour of face and suffering features.

On the 15th flickering before the eyes came on, and on 18th vertigo, headache, and extreme muscular debility; this debility attended by severe pains in joints. The respiration unchanged.

Pulse during first eight days showed constant increase in frequency by several beats; from the 9th day constant decided decrease in frequency by six to seven beats; at the same time the pulse was very excitable, so that the least motion increased in an extraordinary way its frequency from 12 to 20 beats.

Stadion notes that digitaline produces violent catarrhal affection of the nose, but affects the intestinal canal less than digitalis.

Sexual power diminished or quite abolished temporarily. He found

diminution of the water, urea, chloride of sodium, phosphates and sulphates of the urine. The amount of uric acid increases, the specific gravity falls, the degree of acidity remains unchanged. He considers the most important action of digitaline to be its power to cause rapid wasting of the body, and depression of the exchange of material.—Extracted partly from *Fr. Bl. Syderham Soc.*, 1862, p. 158 (which quotes Schmidt's *Jahrbucher*, vol. 115, p. 237, and partly from Nothnagel's *Mat. Med.*, Berlin, 1870, p. 90.

Experiment No. 13, by Dr. T. L. Brunton.

Dr. T. L. Brunton's very accurate experiments on himself with digitaline, continued through several months, are given in his well-known work in fragments, so that it is difficult to present them as a continuous report, or always to specify the doses; for in the full tables showing the action of this substance on the urine they are not recorded, and have to be sought for elsewhere. The doses may be considered as represented by, Feb. 15—24, $\frac{1}{10}$ grain or 10 milligrammes of extractiform digitaline; March 3rd, $\frac{3}{10}$ grain or 4 milligrammes of powdery digitaline obtained from Morson; March 7—14, $\frac{2}{10}$ grain, or 12 milligrammes; and the largest dose $\frac{3}{10}$ grain or 30 milligrammes.

March 5th, 1865.—After taking 12 milligrammes of Morson's digitaline, I experienced a remarkable sleepiness at night, which continued till the 12th, when symptoms of abdominal irritation began to manifest themselves, and these increased till vomiting occurred. On the 14th I felt great languor and prostration, and either on this day, or at least while the languor continued, the mental faculties seemed enfeebled, as, while reading for an examination, the eye glanced over the words, but the mind refused to receive or retain their import. The derangement of sight which I noticed was of two kinds: 1st, a general mistiness of objects, such as is seen before fainting; and, 2nd, a large bright spot advancing before me, and sometimes resembling a ring showing prismatic colours faintly, and similar in character to, though less distinct than, that seen round a light when digitaline has been introduced into the eye. . . . . When digitaline is introduced into the eye it causes smarting, and profuse lachrymation which passes off in a short time, and nothing more is felt except perhaps an occasional rough feeling of the conjunctiva till four or five hours after, when, on looking at a light, you see it surrounded by a halo presenting the prismatic colours, and not quite close round the light, but with a dark space between. This halo increases in diameter the farther you move from the light, and becomes smaller and narrower as you approach. I have noticed an appearance exactly similar when light cirri were crossing the moon. I did not notice any particular difference in the pupil, and the appearance is not due to its dilatation, for I found it quite distinct on looking through a pin-hole in a card. . . . . I found that for some days before vomiting came on, clear drops of water were always gathering at my nose.

March 17th.—Took 30 milligrammes at two different times. At 4 a.m. I awoke, and vomited at intervals for about half an hour.

Vomited matter yellow and liquid, somewhat like yolk of egg; the vomiting violent and painful. Vomited again on rising at 9 a.m. Again at 9.30. Frequent epigastric uneasiness and pain. In forenoon my sight was occasionally not quite clear (just as one sees when about to faint, but somewhat slighter), and a large bright spot occasionally seen, such as is seen after looking at the sun and then looking away at a dark object. Languor and discomfort all day. Occasional nausea. No more vomiting. Pain in chest on drawing breath, from soreness of diaphragm from vomiting. Bowels open in morning. Stool copious, quite loose; in the evening very scanty. A good deal of flatus.

March 18th.—Appetite improved, though not very good. Sight somewhat dim, especially after rising up or walking, and bright spots occasionally seen, chiefly after rising or walking. Bowels open.

March 19th.—Appetite better to-day. Sight dim, and I see a large bright spot, especially after exertion. This not so bad in afternoon. Slight pain in epigastrium occasionally, lasting some time when it occurs. After dinner constant pain in left side, apparently in descending colon. Much flatus at night. Bowels open once. Stool copious, somewhat soft.

March 20th.—Sight clear. After looking at a bright sky and on looking away I see a spot as if I had been looking at the sun. Appetite much better to-day. Pain in left side still there on rising, and continued for some hours. Bowels open once, stool extremely scanty. Pain in side again to-night. A slight threatening of headache before going to bed.

March 21st.—Appetite good. Still occasionally see a bright spot like a large bright soap-bubble, or like the halo that is seen round a light when digitaline is put into the eye, without the central light which is the cause of the halo in the latter case. It seems to come more after exertion, or after long writing, as in taking notes. I am not sure whether it is the attention or looking at the white paper or the stooping that causes it. Bowels open once, stool scanty; partly from large, partly from small, intestines.

March 22nd.—Still see a bright spot occasionally. Bowels open once, stool copious, well formed.

Second set of experiments commence on February 15th, 1866, and are presented very accurately in a tabular form, so as to show the effects, especially on the urine; a record is also given of the pulse. These tables are referred to in § 57. The following entries show the doses; the first numbers are fractions of a grain, the second are milligrammes: —February 15th, $\frac{1}{1000}$, 1; February 16th, $\frac{3}{500}$, 4; February 17th, $\frac{3}{250}$, and so on up to 20 and 35 milligrammes of Morson's digitaline.

Remarking on the pulse, he says:—I have occasionally found my pulse increased (in frequency) after taking digitaline, but sometimes not. He places little value on this, and adds—I have found that my pulse was sometimes quicker, sometimes slower, while I took small doses of digitaline; but that under larger doses there was marked lowering of the pulsations (p. 23).

Again, remarking on the urine and the pulse, he says:—In my

own case I found that with small doses the urine varied just as my pulse had done, being generally increased to a slight extent while I took the digitaline, but sometimes not; while with large doses the diuretic effect was marked (16).

Experiment No. 14, by Dr. Lembke.

August 17th, 1859, 9.30 a.m.—Took $\frac{1}{50}$ grain digitaline. He experienced drawing pain in left wrist and fingers, often severe; in the left foot a similar pain as if numb, especially when at rest; the same drawing pain in the toes of left foot, relieved by walking; soon a similar pain in fingers. Sharp pain in right knee. Behind upper cartilages of right ribs a cutting pain affecting the breathing; some hours after a similar pain in left ribs. Confusion in occiput; heat over the whole body, especially the back; the pulse normal, quickened easily by walking.

August 21st.—Took the same dose, and with a return of the same symptoms, the drawing pains extending to the occiput and vertex.

August 23rd.—Took $\frac{1}{50}$ grain, and experienced similar pains. Had also quickened pulse, heat of skin, muscæ volitantes, circles floating before the eyes, pupil contracted. The pains shift their position, and are worse when at rest than in motion.

September 7th.—Took $\frac{1}{45}$ grain. Similar pains, only more severe and last longer; heavy headache, and constant jerking of the upper lip.

On the 8th felt on waking great vertigo, objects seem to turn horizontally, lessened on closing the eyes, increased by stooping or movement; nausea, with coldness down the back, cold hands, yawning, occasional short dry cough. These symptoms continued for an hour when violent vomiting of whitish sour mucus, with much retching, occurred, partially relieving the head. The vertigo continued, with great sensitiveness of the eyes to light and the nose to smell; again vomiting; still great weight in head, confusion, coldness; nausea abated in four hours so that food could be taken, but headache continued severe all next day.—(*N. Zeit. für hom. Kl.*, iv, 177.)

Experiment No. 15, by Dr. Kopfe.

Dr. Kopfe took at 10 a.m. 2 milligrammes of digitoxine, the crystallised digitaline of Nativelle. After an hour it caused a sensation of faintness, nausea, discomfort, and slight vertigo. The pulse remained as usual, 80 to 84, and was regular. Notwithstanding the unpleasant sensations I continued my work in the laboratory till 1 o'clock, after which I took a walk instead of going to dinner for I had an aversion to every kind of food. The nauseous sensation gradually increased to such a degree that I was forced to make an effort to reach the house in order to avoid vomiting in the street; the decided sensation of weakness and loss of power rapidly increased, and forced me to take a carriage in order to gain my residence, some distance away. Having reached the house I immediately went to bed.

My pulse at this time (2 o'clock) was 58, and intermitted once after 30 to 50 beats; in other respects it was regular. After an hour passed in bed, with constantly increasing discomfort, I vomited a large quantity of dark greenish masses of mucus. Immediately after I experienced decided relief, which, however, lasted only a quarter of an hour, and gave place to the most excessive nauseous sensation. The pulse at this time was very intermittent, and only 40 to the minute; an intermission occurred after every two or rarely three beats. About quarter-past 5 there were several very violent attacks of vomiting, with much distressing retching, great paleness, and collapsed appearance of the face. About six the pulse showed the following tracing (No. 2) with a frequency of 40 to 42 in a minute. This tracing is in marked contrast to the normal. Concerning the latter (Fig. 1), which shows the usual tricrotic pulse, attention is called to the fact that the second elevation is unusually great, and exceeds more than double the height of the first. The digitoxin curve shows an intermission after every two beats. Every second elevation of a couple is noticeably smaller than the first, and makes a gradation to the following intermission. The pulse continued of the same frequency and of the same character into the night. The beat was felt by me in the chest, so that I could readily count it. Every intermission was recognised by the sensation of oppression and anxiety in the chest which it caused. With these symptoms the prostration and loss of power had so far progressed towards evening that I was not able to leave the bed without the support of another person. With these symptoms remarkable weakness of sight developed, so that the features of my friends seemed to swim and become indistinct, and I could only recognise them by their voices. All the objects in the room seemed to run together without any outlines, so that I could only distinguish some very dark, or bright, or large, or small images in the field of vision. Therewith all objects, especially all bright ones, seemed in a slightly yellow light. Above all, the constant and excessive nausea made my condition exceedingly distressing. This distressing condition continued the whole night with equal intensity, and allowed me not a moment's rest. By the morning there had been four attacks of vomiting, about eleven, one, five, and eight, which were associated with persistent efforts to vomit and evacuation of mucus coloured with bile.

Immediately after an attack of vomiting there was always relative relief for a short time. The same condition continued the whole of the next day. The pulse, whose every beat I was still able to feel and count in my thorax, and whose every intermission I was conscious of from the sensation of uneasiness and a kind of slight præcordial anxiety which it caused, was very easily excited by the slightest excitement or physical exertion. During complete physical and mental rest the pulse was 54 in a minute, and intermitted every few beats. The second night was very restless, with partial sleep, which was interrupted four times in one hour by confused anxious dreams and frightful fantasies. The third day, which I still passed in bed, was much more tolerable than the preceding, since the distressing nausea had moderated and I was able to drink a little water. The

weakness of vision, however, still continued, and the yellow vision was in nowise diminished. The pulse continued through the whole day about 60, still very irregular, and intermitted every 40 to 50 beats. On the fourth day the pulse had regained its rhythm, was weak and soft, and very seldom intermitted. After a sound sleep that night I began, on the fifth day, to take short walks leaning on the arm of another. My power of vision had not yet returned, and all objects seemed in a yellow light. The symptoms gradually disappeared during the three succeeding days.—(*Arch. für Exp. Path. und Pharm.*, iii, 275.)

Case of Poisoning, No. 1. Fatal results.

A case which arose from an overdose administered by a quack doctor, and which became the ground of a criminal trial at London in 1826, is shortly noticed in the *Edin. Med. Surg. J.*, xxvii, 223. Six ounces of a strong decoction were taken as a laxative early in the morning. Vomiting, colic and purging were the first symptoms; towards the afternoon lethargy supervened. About midnight the colic and purging returned; afterwards general convulsions made their appearance. A surgeon who saw the patient at an early hour of the succeeding morning found him violently convulsed, with pupils dilated and insensible, and the pulse slow, feeble, and irregular. Coma gradually succeeded, and death took place in twenty-two hours after the poison was swallowed.—(*Christison*, 889.)

Case of Poisoning, No. 2. Recovery.

A healthy, robust, young man, affected with sorethroat, was advised to take "*throatwort tea.*" Having filled a quart pitcher with the fresh leaves of the Digitalis purpurea he poured upon them as much boiling water as the pitcher would hold. Of this strong infusion he took a teacupful on going to bed, which caused him to sleep soundly. In the morning he took a second cupful (the infusion being much stronger), and he then went to his employment. He soon felt dizzy and heavy, began to stagger, lost his consciousness, and at length fell down in a state of syncope. On being conveyed home he vomited severely, and suffered extreme pain in the abdomen. When visited he was conscious, complained of great pain in his head; the pupils were dilated, and the surface was cold, pallid, and covered with a copious perspiration. The pulse was low, about 40 in the minute, three or four feeble pulsations being succeeded by a complete intermission of several seconds; and each stroke, though weak, was given with a peculiar "explosive shock." There was still great pain in the abdomen, with incessant and violent vomiting; no diarrhœa; suppression of urine, and an abundant flow of saliva. Brandy and ammonia with warmth were employed, and after reaction had commenced purgatives were administered. The man slowly recovered, but the pulse presented its peculiar beat and weakness for several days, and during this time the man could not bear the upright position.—(10ª, p. 747.)

Case of Poisoning, No. 3. Death.

A peasant, aged 55 years, took by the advice of a neighbour half a glassful of the juice of Digitalis purpurea for the cure of an intermittent fever. Severe pain in the epigastrium soon set in, followed by constant evacuations, both by vomiting and stool, of a dark yellow colour and offensive smell, confusion of ideas, giddiness, contracted pupil, cold sweat, universal and partial trembling, and likewise stiffening of the body, bending forward of the body, attended with violent tearing pain in the abdomen, sighing respiration, difficulty of swallowing, small irregular pulse, and scanty, very painful expulsion of red urine. These symptoms continued six days; in the seventh the pain subsided, but the patient was stupified, the face livid, the body covered with cold sweat, the respiration more rapid. He died upon the eighth day. On dissection the stomach was found empty and inflamed at the larger curvature, but more so at the pylorus. The duodenum was in the same state, and a gangrenous spot at its larger curvature. The whole of the intestines were inflamed, and partially gangrenous. The liver and spleen were swollen, and the bladder full of urine. [It is to be regretted that neither the heart nor the lungs were examined in this case.]—(*Journal de la Section de Médécine de la Société Académique du Dept. de la Loire Inferieure*, Tom. 7e; also *Oppenheim's Zeitschrift*, 1843, May, p. 52.)

Case of Poisoning, No. 4. Recovery.

A man suffering from asthma took by mistake 4 grammes instead of 5 centigrammes of powdered Digitalis leaves, he was soon attacked by vomiting, vertigo, and dazzling; he could not sit up or distinguish objects. The vomiting was violent, attended by abdominal pains, and continued for two days; on the third day they were less, the pulse remaining slow and slightly irregular. On the fifth day the pulse was still slow, the pains less, the asthma decidedly relieved. The weakness and slowness of the pulse continued during the sixth and seventh days, and these symptoms disappeared on the ninth, but at this date the vision was still confused, and the fire appeared to the patient of a blue colour; it was not until the fourteenth day that the vision became normal (Orfila, *Toxicologie*, 1845, ii, 418, extr. from *Journ. de Med. Chir. Pharm.*, Nov., 1817).

Case of Poisoning, No. 5, by Dr. Mazel.

Victoire Z—, servant with an apothecary, generally of good health, sent for me on the 10th March, 1863, about 5 p.m. She complained of lassitude, violent headache, and pain in the pit of the stomach. Since the previous evening she had vomited a great deal, and felt herself much worse. She attributed her uneasiness and the vomiting to indigestion owing to eating chestnuts. I found the skin cold, the pulse 52, of fair strength, but irregular, and with frequent intermissions. The face was pale, the pupils dilated. Tongue was slightly coated, thirst considerable, the epigastric pain was increased by pressure; abdo-

men painless, no diarrhœa. Sinapisms and infusions of lime flowers were the remedies. On the 11th, third day of her illness, she had not slept at all, the vomiting recurred as often as she had taken anything. The pulse 52, irregular, and intermittent; temperature of skin under normal; pupils still dilated. The cause of her illness was obscure until the apothecary, M. X—, exclaimed, "The cause of her illness has been discovered, the unfortunate girl has been poisoned with infusion of Digitalis." She had taken it by mistake, the infusion containing about 50 grains of Digitalis. From this moment all was explained, the slowness and irregularity of pulse, the vomiting, the muscular debility. She had taken the Digitalis in mistake for borage; for three hours she experienced no uneasiness, soon after felt desire to vomit, then vomiting part of her food, then of a greenish-yellow coloured liquid. She felt bruised all over, had vertigo and dimness of sight to such an extent that she could not come downstairs the whole evening. On Wednesday evening she had not urinated, no movement of bowels. She felt bruised all over, felt as if drunk, and vision still indistinct; soft blowing murmur with the first sounds of the heart. Thursday, fourth day of illness, found patient had passed water during the night and also towards the morning, bowels not opened. The vomiting continues, pulse 42, the respiration embarrassed, frequency 16; still vertigo, felt as if drunk, and much fatigued. Evening pulse 46, vomiting less frequent. Friday, fifth day, pulse 58, less irregular, vomiting less frequent, patient's feelings as before, menstruation has come on. In the afternoon pulse 60 and quite regular. The first part of the night she passed comfortably; at 2 a.m. she got up alone to make water, on returning to bed she suddenly fainted, the attendant rushed to her but she was dead. No post-mortem examination was obtained.

Dr. Mazel adds: I have mentioned with regard to the nervous symptoms, general feeling of coldness, prostration of strength, persistent feeling of drunkenness, headache, vertigo, confusion of sight, dilatation of the pupils, anæsthesia.

There was constant vomiting, constipation, and suppression of urine for fifty hours. In connection with the circulation there was pallor of face, coldness of the skin, slowness, irregularity, and intermittence of the pulse, a blowing murmur with the first sound of the heart (*Gazette des Hôpitaux*, xxxvii, 301, *translated in Edin. Med. Journ.*, 1864-1865, p. 168).

Case of Chronic Poisoning, No. 6. Death.

Poisoning of two healthy recruits by long continued use of Digitalis taken to save them from military service; as reported by Dr. Conrad Köhnhorn.

The symptoms of one were complete loss of appetite, nausea, heartburn, occasional vomiting, constipation, great tenderness over stomach, headache, and dizziness. He presented a miserable appearance, the tongue was thickly coated, and the breath fœtid; temp. 98·6°, pulse 56. These symptoms continued for a month until the end of December, his strength failing, and his aspect becoming more pitiable.

January 1st.—Skin pale and ashy grey, parchment like; lips, conjunctiva, and gums anæmic, tongue moist with greyish-white coating, breath offensive. No disturbance of motor power, sensorium free, temp. 97·8°, pulse 52. These symptoms remained stationary until the ninth January, with an increase of headache, vertigo, and noise in the ears, and the addition of dimness of vision and hiccough.

On the 9th he stood up to have his throat examined and fell down in a faint. At 1 a.m., wishing to go to the closet, he was helped by an assistant to dress, scarcely had he risen when he fainted, became convulsed, and died.

Post-mortem examination.—All the organs were healthy; the blood nowhere coagulable but fluid, and of a dark cherry-red colour; the right side of heart full, the left contained no blood. The brain was very anæmic; mucous membrane of stomach and duodenum presented some isolated spots of congestion upon which the capillaries had ruptured, and ecchymoses were found. The deceased, it was calculated, had 246 grains of powdered Digitalis in the shape of pills during a period of four to five weeks.

No. 6*a*. The other recruit alarmed by this result confessed to having taken some of these pills, but for a shorter time. He complained of loss of appetite, loathing of food, nausea, vomiting, constipation for three or four days, vertigo, tinnitus aurium and the sense of a thick cloud before his eyes (*Lancet*, 1876, vol. 1, p. 582).

Case of Poisoning by Digitaline, No. 7. Recovery.

A married lady, aged 34, fair complexion, nervous temperament, and somewhat anæmic, had been ordered to take two or three granules of Homolle's digitaline (each granule contains a milligramme, nearly $\frac{1}{65}$th of a grain) for palpitation and other hysterical symptoms.

On the 26th April about three p.m., she swallowed fifty-seven of these granules; after this she was able to walk, and felt no inconvenience until six o'clock, when at dinner she had giddiness and a desire to vomit, and vomited several times. A medical friend prescribed a mixture of tartar emetic and sulph. sod., she fortunately only took two spoonfuls of this. At eight p.m. the face was dusky, the pupils dilated, the extremities cold, pain in stomach, pulse 48, weak, irregular; great oppression in the præcordial region, breathing slow, deep, and prolonged. Iced water, coffee, cognac, ether, ammonia, were administered; sinapisms and hot bottles applied to various parts of the body.

April 26th.—No sleep, retching about every hour, pulse 44, weak, intermittent; sighing respiration, face livid, pupils dilated, intellect clear. No action of bowels, urine abundant, great irritability of stomach; great præcordial effusion, comparing it to a heavy stone lying on her chest. At noon the symptoms were the same with the exception of less vomiting. Lemon juice, Liebig's beef tea, brandy, were given, also two grains of musk every hour. At midnight the pulse rose to 60, intermitting once in four beats, temperature normal, steady improvement set in after this (*Lancet*, vol. i, 1880, p. 166).

Case of Poisoning, No. 8. Recovery.

Poisoning No. 8.—A servant maid, aged 22, took at seven a.m. a tablespoonful of tincture of Digitalis; she took her meals and felt no effect until 12.30. At eight p.m. February 4th she was admitted into the Hôtel Dieu, Paris. She had frequent and violent vomiting, first of food, then of greenish-brown, viscid liquid, previous to admission. She complains of very violent epigastric pain, intense pain over right orbit, disordered vision, noise in the ears, and great weakness. Towards five p.m. some spasmodic movements of thigh, then occasional shivering followed by sweats, at the same time flushings of heat towards the ears, and from this spreading all over the body; pulse scarcely to be felt. The night passed without sleep, frequent vomiting of greenish thick matter; throughout the night general numbness.

February 5th (morning).—The face very pale, greenish and livid, with redness over the malar bones; look of extreme exhaustion, no headache, vertigo and noise in ears, sight disordered, unable to see surrounding objects, the pupils dilated and inactive; the intelligence clear; extreme malaise and tenderness at epigastrium, frequent sighing, continual nausea, occasional vomiting; the tongue pale, not coated; no appetite, great thirst, desire for cold drinks; no action of bowels since yesterday, she has passed no urine, the bladder feels distended; the respiration deep and unequal, three or four inspirations are followed by a deep and moaning expiration; the action of the heart most violent, affecting the head of the auscultator; no bruit, the first sound deep and dull, the second very sharp, the heart's beats are irregular, intermittent, 44. At night the urine was drawn off by catheter.

February 6th.—No sleep, occasional vomiting of greenish matter, slight delirium with agitation. The face is less livid, great thirst, intense frontal headache, the vision clear; the pulsations of heart still very violent, felt all over chest, pulse hard and resistant, 48.

February 7th.—No sleep, violent delirium during the night, no vomiting, still the violent headache, acute pain at epigastrium, pulse 38, no urine passed.

February 8th.—Violent delirium, no sleep, continued whining, acute epigastric pain, no vomiting, no action of bowels for two days, intense thirst. Face pale and expressing great prostration, eyes fixed, pupils less dilated. The heart-beats weaker, more frequent, and always intermittent; the pulse easily compressed, irregular, intermittent, varying from 48 to 60. She has passed a quantity of urine, thick and holding in suspension whitish matter, which was not examined.

On the 9th very little delirium, less anxiety, abdomen painful, she has passed urine once, pulse 52.

On the 10th a little sleep, headache and heat of the extremities, general aching, the pulse very unequal, 60.

11th and 12th.—Continued improvement, but on the last date a soft hollow murmur is audible at the base of the heart, and up the aorta towards the carotids.

13th.—Six loose motions. More calmness, the heart's action

violent and continuance of murmur; the pulse unequal, intermittent, varying from 68 to 84. It continued irregular up to the 21st February, but gained in strength (17, p. 685).

Case of Poisoning, No. 9, leading to abortion and death.

A servant maid, aged 27, who was pregnant, took for œdema of the legs a large quantity of the fresh juice of Digitalis. On the third day after taking it she was found in her room lying prostrate, having frequently vomited and lost a considerable quantity of blood from the uterus, which led the attendants to suppose abortion had taken place. On the fourth day she was seen by a medical man, she was then in a state of complete prostration and quite comatose, the face pale, the tongue swollen, red at edges, white in centre; pulse very slow, frequent hiccough and diarrhœa; continued hæmorrhage from uterus, urine and stools passed involuntarily. She died on the thirteenth day.

The autopsy showed partial inflammation of stomach, and a little serum in pericardium (17, p. 801).

Case of Poisoning, No. 10. Recovery.

A young lady, aged 23, attempted to destroy herself by taking sixteen granules of digitaline; as this failed she took in the evening forty more. She then, in addition to vomiting, vertigo, and cold sweats, and weak pulse, with inability to move, experienced a feeling as if the eyes were too large and that they must be forced out of the head. Towards the morning, desiring to live, she sent for medical aid. She was found on her bed almost unable to move, the face very pale, and presented the curious symptom of marked exophthalmos of both eyes. The eyelids are widely opened, the ocular and palpebral conjunctiva of a yellow lemon colour, the pupils dilated.

The patient can make no sound, voiceless. Skin cold, and covered with general sweat, great thirst, tongue dry, coated in centre, red at tip, great epigastric tenderness. Pulse small, hardly to be felt, intermittent, 46 to 48. No urine, no action of the bowels for two days.

Next day voice returned, the shivering and sweats with cold skin ceased; the pulse, still intermittent, rose to 66, the epigastric tenderness disappeared; urine passed several times. Still the marked exophthalmos, the yellow colour of conjunctiva is less. Three days after this the patient is in her usual state, the pulse 64, regular, but still the exophthalmos (17, p. 807).

ARRANGED PATHOGENESIS OF DIGITALIS, WITH COMMENTARY.

The references marked *Ex.* and *P.* refer to experiments and poisonings given p. 407 to 431; the letter *H.* and following figures denote the symptoms as drawn from Dudgeon's translation of Hahnemann's *Reine Arzneimittellehre*.

NERVOUS SYSTEM.

Motory and Sensory.

1. Vertigo, nausea, and faintness.—*Ex.* 15, 9, &c.
2. Confusion, frontal headache, and nausea.—*Ex.* 2.
3. Vertigo on stooping, weight in head on starting up.—*Ex.* 10.
4. Giddiness and stupefaction, the hands unsteady and trembling, shiverings over the back.—*Ex.* 10.
5. Frontal headache, dazzlings, muscular weakness, vision slightly disturbed and stomach deranged.—*Ex.* 8*b*, 8*c*.
6. Confusion and dull uneasiness in head, especially on moving, with painful sensation of weakness in forearm and wrist.—*Ex.* 7.
7. Unable to collect his thoughts, and giddiness.—*H.* 8.
8. Vertigo, cold sweats, and inability to move.—*P.* No. 10.
9. Vertigo, with a difficulty of fixing his eyes on an object, or sees objects in a false light; pressure at occiput.—*Ex.* 9, 13.
10. Vertigo, headache, noise in ears, dimness of vision.—*P.* Nos. 6, 8.
11. The features of my friends seemed to swim and become indistinct, only to be recognised by their voices; all objects seemed to run together, and all bright objects seemed in a yellow light, attended by great prostration and nausea.—*Ex.* 15.
12. Intoxication.—*Ex.* 1, 3, 5, 13, 15.
13. Vomiting and purging, then lethargy; again vomiting and purging, with general violent convulsions, dilated pupils; slow, feeble, irregular pulse, coma and death.—*P.* No. 1.
14. Delirium with agitation, sleeplessness, intense frontal headache, thirst, vomiting, heart's action violent, slow and irregular.—*P.* No. 8.
15. Confusion of ideas, general and partial trembling, stiffening of the body, bending forward of the body, difficult swallowing, sighing respiration, small irregular pulse, urine nearly suppressed. After six days abdominal pains ceased, and coma set in, face livid, cold sweats, hurried breathing, and death.—*P.* No. 3.
16. General numbness throughout the night, preceded by some spasmodic movements of thigh; flushings of heat all over the body, commencing at the ears; shiverings followed by sweats, sleepless nights, vomiting.—*P.* No. 8.

Perception, Ideation.

17. Increased energy of intellectual faculties, especially of the imagination; the nights restless, with dreams remarkable for excessive imagination; attended with rapid, full pulse, and violent action of heart. Next day the peculiar intoxication was developed, which the day after was followed by stupor.—*Ex.* 1.
18. A kind of spiritual intoxication, as if an expansion beyond the usual nervous life, passing away without headache.—*Ex.* 3.
19. Irritable and out of humour.—*Ex.* 7.
20. Gloomy in the head.—*H.* 7.
21. Great languor, the mental faculties enfeebled, as while reading for an examination the eye glanced over the words, but the mind refused to receive or retain their import.—*Ex.* 13.

Sleep.

22. No sleep for six days, at first with nausea, vomiting, epigastric tenderness, vertigo, disordered vision, intense headache, and at last delirium.—*P.* No. 8.
23. Wakeful nights, owing to palpitation of heart.—*Ex.* 7, 9, 10.
24. Disturbed by anxious, terrifying, or disagreeable dreams.—*Ex.* 10, 15; *H.* 363, 369, 370.
25. Restless nights, starting often in sleep, wakens with great lassitude and prostration.—*Ex.* 7.
26. Restless nights, disturbed by dreams and frequent painful erections.—*Ex.* 9.
27. Restless sleep, owing to frequent micturition.—*H.* 366.
28. Remarkable sleepiness at night, which continued for seven days, when symptoms of abdominal irritation set in.—*Ex.* 13.

Head.

29. Weight and heat in head and nape of neck, with vertigo on waking; all objects seem to turn horizontally, increased by stooping or looking up, lessened by shutting the eyes; attended by coldness down back, cold hands, yawning, occasional short dry cough, relieved for a short time by vomiting; lasting four hours, head confused all day.—*Ex.* 14.
30. Heat in the whole head, thinking was difficult, and he forgot everything immediately.—*H.* 36.
31. Severe drawing pain in right forehead and temple, with confusion, shivering, and abdominal pain.—*Ex.* 10.
32. Contractive and pressive pain in forehead and temples, increased by thinking.—*H.* 18.
33. Frontal headache, with pressure on the temples; bruised pain in nape of neck, chest, and epigastrium; quick irregular pulse.—*Ex.* 7.
34. Dull frontal pain, with uneasiness at heart, nausea, and pain in bowels; increased by movement.—*Ex.* 3.
35. Dull frontal pain, feeling of great fulness in ears, flushing of face, lasting two or three minutes, and recurring frequently.—*Ex.* 7, 8*b*, 8*c*.

36. Pressive chill, frontal headache, especially in the morning; similar pains in knees and shoulders and feet, increased by walking.—*Ex.* 14.
37. Shootings, now in the right, now in left, temporal regions, now in the whole head.—*H.* 23.
38. Cutting in right frontal region from eyebrow upwards, lasting a short time, recurring quickly.—*Ex.* 9.
39. Tearing and stitches in sides of the head.—*H.* 15, 16, 31, 32.
40. Intense pain over right orbit, disordered vision, noise in ears, great weakness.—*P.* No. 8.
41. Wakens with severe pressive pain extending from vertex all over head, preventing intellectual work, lasting three days.—*Ex.* 5.
42. Pressive pain over vertex and occiput, with frequent micturition.—*Ex.* 4.
43. Pressure over occiput, head and sight slightly confused.—*Ex.* 3.
44. Sense of confusion in occiput, drawing in vertex and upper part of occiput, turning to pressure, with constant jerking of the upper lip.—*Ex.* 14.
45. Throbbing pains in occiput, confusion of head and sight, with trembling of limbs, relieved in the open air.—*Ex.* 10.
46. Pulsating headache like the beating of waves, as if head would burst; relieved by lying and stooping, but increased when standing and bending back.—*H.* 4, 5, 86.

Comments.

Vertigo is a marked symptom, and indicates Dig. when this symptom is present in cardiac disorder and in hepatic affections especially attended by deficiency of bile. It has been recommended in inflammatory affections of the brain and its meninges, but the condition caused by Dig. is one more of anæmia than hyperæmia. Post-mortem examinations threw little light on this question, for the congestion occasionally found is probably due more to carbonic acid poisoning than to the drug. In poisoning No. 6 there was marked cerebral anæmia. Dig. in its cerebral action closely resembles cuprum; the special indication for both is that form of disease which was first described by Marshall Hall as hydrocephaloid; a further indication is the presence of irritation of the stomach and intestines which is so often the cause in children of this exhausted state of the brain.

In some conditions of *cerebral anæmia* dependent on disease at the aortic valve Dig. exercises, according to Fothergill, a decidedly beneficial action. He mentions a case of an old lady, suffering from aortic obstruction, who was subject to attacks coming on suddenly, when she fell, but did not lose consciousness. Dig. gave great relief, and enabled her to move more about without these attacks coming on (18).

A condition well pointing out its use is that first noted by Abercrombie as so characteristic of low cerebral inflammation in children, the state of the pulse. It is through the whole course of the disease extremely unequal in frequency, varying perhaps every time that it is counted. This remarkable inequality is not observed in other diseases

except from some temporary cause, and is in all affections of the head a symptom deserving much attention (*Dis. of Brain*, Edin., 1834, p. 9).

Bähr ranks Dig. as one of the most important remedies in acute hydrocephalus, and he points to the above condition of the pulse as highly characteristic of its use (*Sc. of Therap.*, i, p. 106). But if the term be strictly confined to serous effusion in children of a tubercular character this or any other remedy is too often of little avail; the disease is almost invariably fatal.

In paralysis of the insane it has been successfully used to calm excitement and procure sleep. This has been gained by ʒss doses of the tincture; probably a third of this dose is sufficient.

In delirium tremens it has been used in very large doses (ʒss of the tincture), but the more the natural history of this disease is known, and its spontaneous cure admitted, the utility for Dig. will share the same fate as the large doses of opium.

Epilepsy.—It has been used in this disease both by the ordinary and the homœopathic school, but the evidence of its utility in either case is not marked. Bähr gives it the most prominent place in all cases of epilepsy caused by onanism or excessive nocturnal emissions. He gives 3x trituration of digitaline, a grain every second day; it soon produces a favourable effect by arresting the emissions (*Sc. Therap.*, i, p. 153).

Dr. Brunton is not sure whether the sleepiness (S. 28) is due to the drug or is a mere coincidence. The characteristic sleep of Dig. is its restlessness, disturbed by dreams, and often by palpitation. Indicated when broken sleep attends cardiac or digestive disease.

Headache.—It has been little employed in headache, but it merits more consideration. The pain is of two kinds—1st, dull and tensive, generally in the frontal region; 2nd, over orbits or in occiput, stitch-like, and sometimes intensely acute; add to these confusion of head, disorder of vision, but more especially of heart and gastric system. Brunton refers to the very favourable testimony of Serre, of Brison, and of Hardwicke in hemicrania. The two first gave it in combination, one with quinine, the other with musk; the last used it plain in ½-grain doses (16, p. 56).

In melancholia and in mania alternating with melancholia Talcott (of New York State Hom. Asylum) uses it with excellent effects when the patient is in a dull and lethargic condition; the pupils much dilated, all sensibility to light or touch seems lost; the pulse is full, regular, or but slightly intermittent, and very slow. The slow pulse he considers the great characteristic (*Hom. Times*, 1878—79).

Face.

47. Face dusky, livid, pupils dilated, weak intermitting pulse, and cardiac oppression.—*P.* Nos. 7, 8.
48. Greyish colour of the face, and suffering features, with great debility.—*Ex.* 12.
49. Face pale with general prostration.—*P.* No. 5.

50. Miserable appearance, with great gastric catarrh, &c.—*P.* Nos. 6, 8.
51. Anæmia of lips, gums, conjunctivæ.—*P.* No. 6.
52. Jerking of the upper lip, with dull headache and pains in limbs.—*Ex.* 14.
53. Cramps like drawing pain in zygoma, dispelled by strong pressure; when he bites the jaw is closed more strongly than he wishes.—*H.* 75, 76.

Ears.

54. Fulness in as if they were suddenly stopped, with flushing of face, especially after excitement.—*Ex.* 7.
55. Pulsations in, especially in left, with palpitation of heart, at night lying on left side.—*Ex.* 7.
56. Tinnitus aurium, headache, vertigo, and dimness of vision.—*P.* Nos. 6, 8.
57. A sudden cracking crash in the head during the siesta, with frightful start.—*H.* 33.
58. Sensation as if ears were contracted internally; pulse heard in them; hearing good. Hissing sound as of boiling water in both ears.—*H.* 78, 80.

Commentary.

Sympt. 57 led Dudgeon to give Dig. to a gentleman who, for eighteen months, had been troubled every night on going to bed with a sound like a loud metallic crash in his head, suddenly waking him up. He first gave it 30 for ten days, then 1, a drop three times a day; the removal of sound was rapid, and recovery permanent (*Br. J. Hom.*, xxvii, 150).

Eyes, External.

59. Burning pain in the region of the right eyebrow, with dimness of vision, as if a veil were before the eyes.—*H.* 40.
60. Violent shootings through right eye, lasting some minutes, with head disturbance after dinner while lying down.—*Ex.* 10.
61. Aching pain on the right eyebrow, towards the external canthus of the eye.—*H.* 41.
62. Tendency of both eyes to turn towards the left side; when he found them to turn to the right they pained, and he then saw all near objects double or threefold; at the same time the face was puffed.—*H.* 42.
63. Pain of the eyes, horrible pain in the eyeballs on touching them.—*H.* 43.
64. Aching pain in the eyeballs.—*H.* 44.
65. Violent inflammation of the eyes.—*H.* 46.
66. In a moderately warm room, less in the open air, the eyes become full of water; they are dim, hot, full of red blood-vessels, with aching pain, and the canthi are full of mucus (as in severe coryza).—*H.* 69.

67. In the inner canthus a painful scraping sensation, as if coarse dust had got into it.—*H.* 70.
68. Inflammation of the Meibomian glands on the borders of the eyelids.—*H.* 73.
69. Could not look steadily at bright objects, vision impaired.—*Ex.* 8.
70. Photophobia, eyes red, frontal fulness.—*Ex.* 1.
71. Great sensitiveness of eyes to light and nose to smell, vertigo and nausea.—*Ex.* 14.
72. Marked exophthalmos, feeling as if the eyes were too large and must be forced out; the eyelids are widely opened, the ocular and palpebral conjunctiva is of a yellow lemon colour, the pupils dilated; pulse slow, weak, and intermittent.—*P.* No. 10.
73. Conjunctiva anæmic, also lips and gums.—*P.* No. 6.

Internal Eye and Vision.

74. Pupils dilated.—*P.* No. 8.
75. Right pupil somewhat larger than left, vision confused, severe palpitation of heart.—*Ex.* 10.
76. Dilated pupils, especially right, bright spots before the right eye, perversion of vision with anxiety, feeling as if finger pressed on eye. —*Ex.* 2.
77. During the ten following days, though no more Dig. was taken, he felt considerable intoxication, sight disordered, and pupils dilated, no decided headache.—*Ex.* 8.
78. Smarting and profuse lachrymation, which soon passes off, leaving an occasional rough feeling of the conjunctiva, then in 4 to 5 hours on looking at a light saw it surrounded by a prismatic halo. This lasted usually for a day. During this time the pupil was slightly dilated, and less contractile than usual. Slight opalescence noticeable in the crystalline lens. *Homolle, local application of digitaline to eye.*
79. Glimmering in eyes, transitory appearance of light and dark spots, appearing in left eye some hours before the right was affected. On closing the eyes and gently rubbing them a tremulous phosphorescence was produced.—*Ex.* 11.
80. A general mistiness of objects such as is seen before fainting.—*Ex.* 13.
81. Confused vision, the fire appeared of a blue colour; this lasted more than a week.—*P.* No. 4.
82. Sight somewhat dim, especially after walking or rising, or writing long, occasionally bright spots like a large soap bubble are seen.
83. Black circles, muscæ volitantes, sensitiveness to light, pupils contracted, heat in head and nape of neck.—*Ex.* 14.
84. Sparkling before the eyes, double vision, giddiness, quick pulse.—*Ex.* 6.
85. Vision very indistinct with prostration and nausea.—*Ex.* 15.

Commentary.

The influence of Dig. on the pupil is uncertain unless large doses

sufficient to excite marked cerebral disturbance are given, then there is generally dilatation, and this is attended by a characteristic symptom—disordered vision, but arising quite independently of the dilated pupil. Brunton remarks on § 78 : I did not notice any particular difference in the pupil, and the appearance (prismatic halo) is not due to its dilatation, for I found it quite distinct on looking through a pin hole in a card (13, p. 47). The disordered vision (except after local application) is accompanied by more or less signs of intoxication and headache, but it continues for days after these have quite passed away.

The use of Dig. in ophthalmic disease has seldom been recorded ; the symptoms point to its administration in catarrhal and scrofulous ophthalmia. Knorre relates a case of ophth. catarrhalis occurring after suddenly suppressed coryza, where it was the sole remedy. Hartlaub recommends it in the photophobia of scrofulous ophthalmia, and Hartmann considers it indispensable in scrofulous blepharophthalmia, followed by merc. and hep. (*Dudgeon, Dis. of Eye, Brit. Hom. Journ.*, vi, 355).

DIGESTIVE SYSTEM.

Mouth (including Salivary Glands, Tongue, and Fauces).

86. Salivation.—*Ex.* 2, *P.* No. 2, *H.* 96.
87. Salivation, copious, with pressure at the stomach.—*Ex.* 2.
88. Salivation with painful feelings of hunger.—*Ex.* 1.
89. Collection of watery saliva in mouth, at first sweet but afterwards very salt, in frequent fits.—*H.*, 99.
90. Mouth moist and thick, salivation.—*Ex.* 1.
91. Sweet saliva.—*H.*, 100, 101.
92. Dryness of mouth, gums and pharynx, with thirst, headache, vision affected.—*Ex.* 2 (9, p. 887).
93. Tongue dry, coated in centre, red at tip, epigastric tenderness, thirst.—*P.* No. 10.
94. Tongue, white coated and slightly swollen.—*Ex.* 1.
95. Tongue pale, not coated, malaise, epigastric tenderness.—*P.* No. 8.
96. Tongue with thick greenish-white coating, nausea, tenderness of epigastrium.—*P.* No. 6.
97. Tongue swollen, red at edges, white in centre, frequent hiccough, diarrhœa, and coma.—*P.* No. 9.
98. Flat, slimy taste, feeling in mouth as if lined with velvet.—*H.* 104.
99. Scraping in throat with hoarseness.—*Ex.* 3.
100. Rawness, burning in œsophagus and windpipe, abdominal pains.—*Ex.* 3, 5.

Appetite and Thirst.

101. Anorexia with clean tongue.—*H.* 115.
102. Complete loss of appetite with marked derangement of stomach.—*P.* No. 6.
103. Appetite increased.—*Ex.* 8*b*, *Germain.*

104. Loathing of food, nausea, vomiting, hiccough, constipation, vertigo. —*P.* No. 6*a*.

105. Painful sense of hunger, even after taking a hearty meal, with nausea, mouth clammy.—*Ex.* 1.

106. Thirst, nausea, and uneasiness at the stomach.—*Ex.* 1.

107. Great thirst, dryness of mouth and throat, headache.—*Ex.* 2.

108. Considerable thirst, coated tongue, epigastric uneasiness.—*P.* No. 5.

109. Intense thirst, acute epigastric pain, no vomiting, bowels costive, urine suppressed, delirium.—*P.* No. 8.

Commentary.

Unless the dose is sufficient to disorder stomach, the appetite is little affected. Germain experimented on himself, but the record of his experiments shows no increase of appetite; he, however, says, "In small doses it excites appetite, but in those necessary to act on heart, it induces nausea, anorexia, and even dangerous dyspepsia."—*Gaz. Hebdomadaire*, No. 44, 1860, p. 712.

NAUSEA AND VOMITING.

101*a*. Excessive nausea.—*Nearly every Exp.*

102*a*. Nausea, vertigo, frontal headache, confusion in head, unable to walk quickly or steadily.—*Ex.* 2, 15.

103*a*. Nausea, heartburn, great epigastric tenderness, constipation, headache, dizziness.—*P.* No. 6.

104*a*. Violent vomiting with great retching.—*Ex.* 8, 13, 15, &c.

105*a*. Constant nausea, repeated and violent vomiting of bilious-coloured masses of mucus, preceded and followed by violent retching.—*Ex.* 15.

106*a*. Stomach so irritable all food is vomited.—*Ex.* 8.

107*a*. Incessant and violent vomiting, abdominal pains, no diarrhœa, copious salivation, suppression of urine.—*P.* No. 2.

108*a*. Vomiting of stuff like yolk of egg, as if stomach were contracting with great effort as in cramp, leaving for long a sense of soreness.—*Ex.* 13.

109*a*. Hiccough.—*P.* No. 6*a*, *H.* 139.

SENSATIONS IN STOMACH.

110. Sense of emptiness and sinking in stomach.—*Ex.* 8*c*, 9, *H.* 142.

111. Same with frontal headache, dazzlings, loss of appetite, intestinal pains and flatulence, borborygmi, urine abundant.—*Ex.* 8*c*.

112. Sensation of distension and as if food were pressed up the gullet, offensive flatus.—*Ex.* 10, 9.

113. Heartburn, flatulence, and sensation as if the throat were compressed by enlarged tonsils.—*Ex.* 3.

114. Dull pain, and sense of distension, with lassitude after dinner.—*Ex.* 7.

115. Epigastric tenderness, great thirst, desire for cold drinks, tongue pale, not coated, bowels costive.—*P.* No. 8.

116. Epigastric uneasiness, increased by pressure.—*Ex.* 13, *P.* No. 5.
117. Pressure in stomach and copious salivation.—*Ex.* 2.
118. Cutting aching in epigastrium, with nausea increased by touch, only felt when standing.—*H.* 131.
119. Epigastric constriction, pinching pains in *Ex.* 9, 10, 13, 8*a*, *H.* 145, 146.
120. Bruised pain in epigastrium and sternum, with flatulence after dinner, with great languor and inability to study.—*Ex.* 7.
121. Sharp burning pain extending from stomach up to throat with pressive pain over vertex and occiput.—*Ex.* 4.

Commentary.

The very marked action of Digitalis on the stomach (wholly independent of any local irritation), has not met with the attention in dyspepsia which it merits. It is well indicated in chronic gastritis, especially for such symptoms as S. 104, 105, 106, 113, 116, 117, 120. It is indicated in gastric catarrh due to obstructed circulation caused by cardiac disease. It has proved useful in the sickness and retchings of drunkards, often connected with hepatic disease. It is indicated in the neuralgic pain in stomach which sometimes attends disease of the heart, and is quite unconnected with taking food. Few drugs have tenderness of the epigastrium so marked as Dig. Bähr gives Dig. as one of the noteworthy remedies in gastritis; he also considers it an appropriate remedy in febris gastrica catarrhalis, where the peculiar pulse exists, *vide* S. 196, 197, 198. (*Sc. Therap.* i, p. 431).

ABDOMEN.

122. Griping pains and borborygmi.—*Ex.* 3, *H.* 176 to 179.
123. Pinching pains as if diarrhœa might come on, but motion normal. —*Ex.* 3, 10.
124. Griping pains with frequent passing of flatus, then offensive pappy stools.—*Ex.* 10.
125. Colicky pains followed by sudden evacuation of liquid stools.—*Ex.* 7.
26. Griping pains extending from hypogastrium to testicles, followed afterwards by urgent desire to pass water.—*Ex.* 3.
127. Pain in hypogastrium lasting half an hour, followed by heat in stomach extending to œsophagus.—*Ex.* 4.
128. Intestinal pains, bilious stools, the abdominal walls strongly retracted upon the intestines, tongue swollen, coated yellow, skin hot and dry, pulse 150, hard, and wiry.—*Ex.* 1.
129. Cutting, tearing pain in the evening, especially when rising up from a seat; aching pain in vertex.—*H.* 169.
130. Constant pain in left side, apparently in descending colon, after dinner, much flatus at night, one copious soft stool on rising, and again pain in left side lasting some hours.—*Ex.* 13.
131. In left side sensation as if something were forcing itself through. *H.* 183.
132. Persistent stitch in left hypochondriac region.—*H.* 157.

133. Under left false ribs pain as of laceration.—*H.* 171.
134. Pain of excoriation in left inguinal ring as if a hernia would come out.—*H.* 173.
135. Pressive tension in right groin, increasing to throbbing, principally when walking, but also when sitting and when pressed.—*H.* 174, 175.
136. Stitches in abdomen increased by expiration.—*H.* 162 to 164.
137. Pain as if of ulceration on moving, not when touched.—*H.* 181.
138. Severe abdominal pains, constant vomiting, diarrhœa, collapse, and death.—*P.* No. 3, *H.* 137.
139. Pulsations of abdominal aorta, anxiety, epigastric constriction, and cough with pneumonic expectoration.—*Ex.* 8*a*.

Rectum.

140. Bilious, loose motions.—*Ex.* 1.
141. Diarrhœa with bellyache, fæces mixed with mucus, pain ceasing after a motion.—*H.* 190, 198, 200, 201.
142. Bellyache in the morning in bed, followed by two attacks of diarrhœa, and afterwards urging to stool.—*H.* 198.
143. Urging to stool.—*H.* 184.
144. After constipation for forty-eight hours there occurred a soft, yellow stool without suffering.—*H.* 186.
145. After a copious, loose stool, next day scanty motion consisting of a dozen pellets like those of a rabbit, and one like a walnut.—*Ex.* 13.
146. Bowels regular, unusual for the prover, then becoming costive.—*Ex.* 13.
147. Costive, urine abundant.—*P.* No. 7.
148. Constipation and suppression of urine.—*P.* No. 5, No. 8, No. 10.
149. Constipation with nausea, vomiting and loathing of food.—*P.* No. 6*a*.

Commentary.

The gastric and intestinal symptoms indicate its use in cholera infantum, especially when hydrocephaloid conditions threaten. Comp. *ars.*, *cup.*, *ver.* The intestinal condition of Dig. is more towards diarrhœa than constipation. The flatulent condition S. 130, 131, 132, 133 merits clinical attention, especially with deficient hepatic action.

Ascites and diuresis under Urine.

Hahnemann's Sympt. 187, 188, have been omitted as being drawn from diseased subjects; he also gives pale motions in his Chr. Dis. arrangement. Giddiness and pale motions a good indication for Dig. Useful in pale motions of children, especially of a scrofulous constitution.

Urinary Organs.

150. Urine increased.—*Ex.* 1, 4, *H.* 214, *P.* No. 7.
151. Diuresis not constant after small doses, but marked after large.—*Ex.* 13.
152. Urine passed abundantly, at night very troublesome, with pain in renal region.

153. Increase of urine, and great excitement of genital organs.—*Ex.* 5.
154. Urging to urinate, passing pale copious urine, accompanied by frequent and persistent erections.—*Ex.* 10.
155. Frequent desire to urinate, with itching excitement of glans penis.—*Ex.* 3.
156. Constant urging to urinate at night, on getting up had dizziness.—*H.* 214.
157. Frequent desire to urinate with warmth of the whole body, and colicky pains.—*Ex.* 3.
158. A contractive pain in the urinary bladder, whilst urinating; the urine was evacuated with difficulty owing to this pain.—*H.* 209.
159. The first day he only passes urine twice and but little, but without suffering; after forty-eight hours the urine becomes much more copious and accompanied by cutting drawing in the bladder.—*H.* 211.
160. Frequent urging to urinate; the urine only comes away by drops, with burning sensation in the urethra and the region of the glans, and the urine had a reddish appearance.—*H.* 212.
161. Urine very scanty, red, passed with pain and difficulty.—*P.* No. 3.
162. Urine abundant, passed with burning.—*Ex.* 8 *c*.
163. In rare instances it occasions great strangury, with a desire, almost incessant, to pass water, accompanied by great and painful straining.—*Ringer* (19), p. 471.
164. Suppresssion of urine (*P.* No. 2, 8, 10); suppression for fifty hours, then abundant flow.—*P.* No. 5.
165. Bladder's contractility impaired, external pressure required to expel the urine which was abundant (*Ex.* 8 *a*); catheter required.—*P.* No. 8.
166. Diminution of the water, urea, chloride of sodium, phosphates, and sulphates of the urine; the uric acid increases, sp. gr. falls, degree of acidity remains unchanged.—*Ex.* 12, 13.

Commentary.

Strangury, it merits trial in when the more common remedies have failed; might be useful in *irritable bladder* with profuse urine, due to diminution of salts in urine.

Uræmic poisoning, so called. Indications: vomiting, headache, convulsions, with a normal or increased secretion of urine, and feeble, irregular action of heart.

Palsy of Bladder.—Sym. 165 suggests its employment when the failure is due to overstrained exhausted muscle, *myopathic palsy*.

Suppression of Urine.—Six interesting cases recorded where its external application to abdomen, as a poultice of the leaves or tincture added to linseed meal, had very beneficial effects—four of the cases dependent on renal calculus, two on acute affection of kidney. Example of the latter:—Young healthy farmer suddenly attacked, on seventh day case considered hopeless, the catheter passed brought away a teaspoonful of highly albuminous urine; ninth day Digitalis poultice applied over abdomen at twelve a.m.; six p.m. no urine, poultice renewed; ten p.m., urine passed in large quantities. In the other case,

on fourth day, when patient was in stupor, ℥j tr. Dig. in linseed-meal poultice, worn all night; next morning profuse diuresis, eight ordinary chamber-pots full passed in twelve hours; next day patient died exhausted—probably over-action of Digitalis (?). No benefit noticed until Digitalis told on the pulse; in one case it fell in ninety minutes from 108 to 70.—*Med. Times and Gaz.*, 1868, p. 86.

Diuretic effect in Anasarca attending cardiac disease. A valuable remedy, useful not simply because it excites diuresis, but because it relieves the circulatory organs, and its efficacy is in proportion to its homœopathicity to the cardiac disease, that is, when heart is irritable, and action weak and irregular. Much less serviceable when dropsy is mainly due to valvular disease. Its external application sometimes answers better in these cases than when given internally; useful in this form in the experience of Brera, Christison, Trousseau.

Falot cured three cases of ascites, independent of organic disease, with fomentations of Dig. (23).

Suppression of urine is the result of poisonous doses; for suppression in the collapse of cholera it was found useless by Drysdale (*B. J. Hom.*, viii, p. 161); kali bich. from his experience in that epidemic promises to be an important remedy.

Genital Organs (Male).

167. Much severe painful excitement of; increased flow of urine.—*Ex.* 3, 5, 9.

168. Excitement of, so troublesome as to induce him to suspend taking the Digitalis for a few days.—*Ex.* 6.

169. Violent painful erections, with seminal emissions at night (*Ex.* 9). Nights restless and disturbed owing to violent erections.—*Ex.* 10.

170. Several times in the night sensations as if emissions would occur, but none came; in the morning viscid moisture at mouth of urethra. —*H.* 226.

171. Sexual power diminished or quite abolished temporarily (*Ex.* 12). The organ becomes flaccid, no erections, no desire.—*Brughman* (42), *Gouvrat* (34).

Genital Organs (Female).

172. In uterine region severe pain, which passes into the hypogastrium, in every respect resembling the first stage of labour.—*Dickinson* (43), p. 9, *vide Commentary*.

173. Strong, regular, and intermittent uterine contractions; it has been employed to excite abortion.—*Gouvrat* (34).

174. Abortion and uterine hæmorrhage.—*P.* No. 9.

Commentary.

The circumstance of nocturnal emissions, as in sympt. 169, is hardly sufficient to establish a homœopathic relation to spermatorrhœa, a term which ought to be limited to discharges of semen independent of any erethism; in this sense Bähr employs the name. For excessive

emissions with diminished irritability he recommends Digitalis. Among all the remedies for spermatorrhœa Digitalis, and more particularly digitaline, has the best effect. A few doses 3x trit. of this medicine are generally sufficient to effect a complete cure, or at least a marked improvement. It should be given in the morning, in the evening it is very apt to disturb the sleep (*Sc. of Therap.*, ii, p. 19). Hughes says he has several times adopted this practice with success (*Therap.*, p. 267). Few remedies are more successful in arresting spermatorrhœa, says Ringer, than Digitalis ; a drachm or two of infusion twice or thrice a day is generally sufficient (19, p. 471). Brughman gives it (on antipathic relations) with good results where it is desired to reduce great erethism of the genital organs, whether due to excitable temperament, to sedentary life, to the privation or the abuse of sexual functions. He also used it successfully in subduing the congestion and irritation of the penis and testicles attending venereal disease. He narrates, among various cases, an obstinate one of a young man who had nocturnal emissions every night, and who had tried all sorts of treatment. He gave 40 centigrammes the first day, then 35, and on the third day 30 centigrammes ; this latter dose was continued for fifteen days, at the end of that time no pollutions had occurred. No more Digitalis was given for six days, then one emission occurred ; one dose of 40 centigrammes was given, and two weeks after this no emission had occurred. He relates its efficacy in swelling of epididymis which had existed six years (42).

The employment of Digitalis in spermatorrhœa was at first accidental, having been given by Corvisart to a cardiac patient who also had this weakness. He relates three extreme cases, they were greatly benefited, but in none was cure complete (*L'Union Méd., Avril*, 1853). Laroche records a case treated with success, dose 1 to 2 grains of powdered leaves gradually increased to 88 grains (*Bul. Gén. de Thérap.*, 1854, ii, p. 76).

Menorrhagia.—In consequence of the accidental cure by Digitalis of a severe menorrhagia, Dr. Dickinson, in St. George's Hospital, tried it in seventeen cases. In every case of hæmorrhage unconnected with organic disease the administration of Digitalis was resorted to as the sole treatment, and the discharge was arrested by it. When large doses, ʒj to ʒiss, of the infusion were given, the discharge never appeared after the second day ; when smaller doses were used it never continued beyond the fourth day. In hæmorrhages connected with organic uterine disease it acted with less certainty, its exhibition was required for a longer time, the effect was transient (43). These results are confirmed by Trousseau, and also by Reith (38, p. 214).

Desnos ranks Digitalis among the medicines having the power of controlling congestive metrorrhagia ; he finds it useful even where secale has failed. He reports a case where, a variety of means having failed, it immediately induced stoppage of the metrorrhagia. Dose 7½ to 9 grains in infusion (*Lond. Med. Rec.*, January 15th, 1878, p. 31).

Decaisne in a case of fungous growth in uterine cavity, occasioning profuse hæmorrhage, controlled it entirely by digitaline in daily doses of six granules (*Bull. Therap.*, lvi, 392).

In its uterine action it resembles secale, as also in its effects on unstriated muscular fibre throughout the body.

RESPIRATORY ORGANS.

Nose.

175. Drops of clear water always gathering at the nose.—*Ex.* 13.
176. Violent coryza.—*Ex.* 12, *H.* 229.
177. Chronic nasal catarrh much inereased.—*Ex.* 10.
178. Sensitiveness of nose to smells, and eyes to light.—*Ex.* 14.

Walls of the Chest.

179. General sense of pressure over, affecting breathing.—*Ex.* 14.
180. Dull, disagreeable pressure over chest and epigastrium, relieved by beating on the chest, lasting three hours.—*Ex.* 7.
181. Bruised pains in nape of neck, between the shoulders and extending forwards over anterior part of chest, the flesh painful when pressed, especially over sternum, attended with headache and bruised pain in epigastrium.—*Ex.* 7.
182. Pain in chest from soreness of diaphragm, from violent vomiting. —*Ex.* 13.
183. Pains in, especially right side, pain in forehead and temples, frequent shivering.—*Ex.* 10.
184. In the right side of the chest a strong perceptible beating as from an artery synchronous with the pulse (after ½ h.).—*H.* 247.
185. Painful suffocating constriction of the chest, as if its internal parts were all grown together, especially in the morning on awaking, whence he must quickly sit upright.—*H.* 248.
186. Contractive pains in the sternum itself; they are increased by bending forward the head and upper part of the body (after 2½ h.). —*H.* 249.
187. As if raw in the chest and stitches in it.—*H.* 250.
188. Cutting pain, checking the breath, behind cartilages of right upper ribs, in half an hour felt more severely behind cartilages of left ribs. —*Ex.* 14.
189. Contractive pains in sternum and under ribs, increased by stooping, with anxiety and strong palpitation.—*H.* 245, 246.
190. Sharp stitches above scrobiculus cordis.—*H.* 260, 261.
191. Quick, transient cutting pains in right nipple, taking away the breath.—*Ex.* 9.
192. Drawing, pressive pain under right mammary region, preventing him long from sleeping, restless night.—*Ex.* Violent throbbing pain between left nipple and axilla, when lying in bed on left side, pulse unequal.—*Ex.* 10.
193. Severe throbbing pain in right pectoralis major, in the evening restlessness and oppressed breathing.—*Ex.* 10.
194. Uneasiness in mammary regions, especially left, extending to left shoulder and upper part of arm.—*Ex.* 7.

Respiration.

195. Oppression like a stone lying on chest.—*P.* No. 7.

196. Troublesome oppressed breathing, sense of constriction, increasing towards the evening, attended by sense of exhaustion in chest, and frequent dry cough.—*Ex.* 9.

197. On sitting in a bent position aching on the lower part of the chest; the breathing is shorter and not enough; he cannot hold his breath long but must quickly breathe again.—*H.* 252.

198. Breathing difficult and slowly and deeply drawn.—*H.* 253.

199. Tension on the chest and aching in the scrobiculus cordis, which often forces him to take a deep inspiration.—*H.* 254.

200. For many days a painful tightness of chest; he must often draw a deep breath, and yet he felt as if he had not breathed in sufficient air, especially when sitting.—*H.* 255.

189*a*. Desire to breathe rapidly, with pains on both sides of thorax, and a feeling as if something wicked had been done or evil impending. —*Ex.* 10.

190*a*. Slow, deep, unequal, and prolonged, with weak intermitting pulse, and præcordial oppression.—*P.* No. 7, 8.

191*a*. Respiration much embarrassed, 16 in the minute, pulse 58, irregular, vertigo, sense of great fatigue and intoxication.—*P.* No. 5. Sighing respiration, pulse slow, intermitting, face livid, pupils dilated. —*P.* No. 2, 7, 8.

Cough, &c.

192*a*. Cough and coryza to a great degree.—*H.* 229.

193*a*. In the morning he is hoarse, the irritation to cough extends to the palate.—*H.* 230, 231, 234.

194*a*. Dry cough as from tickling in trachea, which excites aching pains in arm and shoulder.—*H.* 235, 238.

Commentary.

S. 192*a* 193*a* are probably due to the direct local irritation of Dig. on epiglottis and fauces.

Dig. has now lost its former reputation in pulmonary phthisis. The dyspnœa and oppression are marked symptoms in many provers, and continued in Ex. 9 for five weeks after the last dose.

Wurmb and Fleischmann have noticed the best effects from its use in pleuritis serosa, and Bähr confirms their favourable report, adding: "If this process (rheumatic) spreads to the pleura, or if pleuritis is from the start a rheumatic disease, no remedy, next to bryony, is better adapted for its treatment" (*Sc. Ther.*, ii, 337).

Lobethal (*All. Hom. Zeit.*, xiii, No. 23), considers Dig., in five to ten drop doses of tincture, useful in drunkards suffering from hydrothorax.

For hydrothorax as a symptom of general dropsy dependent on cardiac disease, vid. Heart. S. 181, 185, 186, 188 point to its use in pleurodynia. P.M. observations show no signs of inflammation of pleura.

CIRCULATORY ORGANS.

Pulse and Circulation.

195*a*. Pulse smaller and weaker, never slower, occasionally quicker.—*Ex.* 3, 4, 9.

196*a*. Quicker, weak, of variable strength.—*Ex.* 7, 5.

197*a*. Decided increase in frequency, the least motion increased the frequency in an extraordinary way.—*Ex.* 12.

198*a*. Much quickened by standing up, when sitting it is full and irregular; on standing up weak and irregular.—*Ex.* 9.

199*a*. Acceleration, intermittence, and irregularity in strength.—*Ex.* 7, 15.

200*a*. Heart's action somewhat violent, pulse 100, strong and hard, threatening delirium; next day pulse 150, small and wiry, heart's action weak, and accompanied by palpitations; next day pulse fell to 60, small and feeble, great general prostration.—*Ex.* 1.

201. Fell to 40, intermitting every third beat; the beats felt readily in chest, and every interruption recognised by the sense of oppression and cardiac anxiety which it caused; great general prostration.—*Ex.* 15.

202. During complete mental and bodily rest the pulse was 54, intermitting every few beats, and easily excited by the least mental or bodily excitement.—*Ex.* 13.

203. Pulse 48 to 60, easily compressed, irregular, intermittent, with violent action of heart.—*P.* No. 8.

204. Pulse 40, weak, three or four pulsations followed by a complete interruption of some seconds, each beat, though weak, given with a peculiar explosive shock.—*P.* No. 2.

Heart and Præcordia.

205. Great præcordial oppression, like a stone on the chest.—*P.* No. 7.

206. Dull, cutting, transient pain in, with increased frequency of pulse, which is rapidly augmented by the least motion.—*Ex.* 12.

207. Severe dull stitches in, on walking.—*Ex.* 10.

208. Stitches in, with palpitation, in the evening.—*Ex.* 10.

209. Frequently recurring pressive pain in; faintness standing or sitting.—*Ex.* 10.

210. Dull disagreeable sensation in; pulse 80, intermitting.—*Ex.* 7.

211. Uneasiness, sometimes amounting to pain, in, with nausea and frontal headache.—*Ex.* 7.

212. Sensation as if heart stood still, with pressure on chest, preceded by throbbing pain in cardiac region, followed by much palpitation; pulse quick, unequal.—*Ex.* 10.

213. Palpitation.—*H.* 244, *Ex.* 1, 2, 7, 10.

214. Almost audible, strong, aching heart's beats, with anxiety and contractive pains under the sternum and ribs, increased by stooping forward.—*H.* 245, 246.

215. Uneasiness at heart, with palpitations easily excited.—*Ex.* 7.
216. Action of heart softer and weaker than usual, and constantly accompanied with palpitation.—*Ex.* 1.
217. Palpitations at night, especially on lying on left side, with pulsations in ears, especially left.—*Ex.* 7.
218. Great palpitation and anxiety; pulse 100, strong; obliged to leave his bed and open the window for air.—*Ex.* 2.
219. Palpitations, frightening him out of sleep.—*Ex.* 2.
220. Palpitations causing sleeplessness; rapid pulse.—*Ex.* 9.
221. Violent palpitations at night, walls of chest seemed shaken; pulse 74; relieved at once by turning to right side.—*Ex.* 10.
222. Tendency to syncope, and giddiness on standing.—*Ex.* 9.
223. Liability to faint on sitting up.—*Numerous cases.*
224. Syncope, fatal.—*P.* Nos. 5, 6.
225. Low intermitting pulse, 40, and weakness for several days, during this time he could not bear to be in the upright position.—*P.* No. 2.
226. Soft blowing murmur with the first sound; pulse 42, weak, irregular, intermittent.—*P.* No. 5.
227. Violent action of heart, felt all over chest; irregular, intermittent pulse, easily compressed, 48 to 60. A soft bellows murmur is audible at the base of the heart and up the aorta towards the carotids. The pulse rose to 68—84, and the other symptoms continued for eleven days.—*P.* No. 8.

Commentary.

The condition of the heart under the influence of Digitalis has been already fully considered (p. 392); here it may be briefly stated to be one of enfeebled co-ordinating and muscular power. The characteristic pulse from moderate doses is shown in Symp. 195*a*, 196*a*, 197*a*, and those of longer continued or larger doses in Symp. 201, 203, 204. A marked characteristic is intermittence and irregularity; even the slow beats are those of a weak heart; the conditions Symp. 197*a*, 198*a*, 202, are good indications for its use. In *all diseases of the heart* attended by palpitations, weak, intermittent, but especially irregular, pulse, Digitalis is well indicated, and it will be useful in proportion as valvular disease is absent. It is also useful in *cardiac muscular failure* following fevers, and pericarditis: compare with ars. and naja. A tremulous, apparently strong acting heart is no counterindication when the pulse is weak or irregular; it is in this condition, like palpitation, a sign of an overtasked organ.

It is not indicated in *hypertrophy*, for this is not a disease, but a compensatory growth to overcome some obstacle: hence the evil which has often been done in pushing the action of this drug in full doses. But an hypertrophied heart like one of normal size may at times present the indications for Digitalis.

In *hypertrophy with dilatation* it will be useful in proportion to the absence of valvular lesion. Fothergill's experience may be stated in general terms,—useful whenever there is cardiac muscular failure (18). Ringer gives very clearly the indications when it will be of eminent

service; the following is an abstract: dropsy, distressed breathing, especially at night; patient cannot lie down, distension of jugular veins, pulse frequent, feeble, fluttering and irregular; face dusky and livid, urine scanty and high coloured, the heart seen and felt to beat over a too extensive area, impulse undulating and the beating very irregular and intermittent; physical examination betrays great dilatation of left ventricle, also considerable hypertrophy; a murmur is heard indicating *mitral regurgitant disease;* there may also be disease of the *aortic valves* (19, p. 449).

Inflammation of the heart and its membranes is not shown in the pathogenesis of Digitalis, nor in any post-mortem examination; yet a group of symptoms are present which show many features of resemblance to the disturbances which are consequent on carditis. Bähr attaches a high value to it in certain forms; the *rheumatic* he considers well adapted, especially when it sets in insidiously, and not in a violent form; the sooner pericardial friction sound disappears the better does it act; other indications—rapidly increasing dyspnœa, signs of venous congestion, vertigo, delirium, vomiting at the commencement or course of the disease, hyperæmia of liver, jaundice.

Hitherto acon., ars., colch., bry. and spig. have been more frequently used, and in the writer's experience are more to be depended on than Digitalis; but the rheumatic pathogenesis of Digitalis, pointed out by Bähr, gives it claims, especially when ars. being indicated has failed, and an arhythmic asystolia exists.

In *endocarditis* the writer is inclined to place Dig. considerably below acon. and ars.; the post-mortem appearances presented by the latter are very marked, both in endocardium and pericardium, and are absent in Dig. When pericardial effusion is attendant on inflammatory action, ars. and sul. are indicated. It is more *pericardial effusion attendant on cardiac dropsy* which indicates Dig.

Cardiac dropsy. In this condition Digitalis is one of the most valuable medicines, and the benefit given is in proportion to its homœopathic relation to the cause of the dropsy, for dropsy is not in its pathogenesis; when much valvular disease is present the probabilities of relief are much less, and it is necessary then to give it in larger doses. The indication is not merely to aid an enfeebled heart, but also by exciting diuresis to relieve the capillary circulation oppressed still further by the valvular lesion.

Bähr (15, p. 142), Hughes (*Therapeutics*, ii, p. 298), Lobethal (*Zeit. für Hom. Klin.*, i, p. 115), Jousset, and the writer, recommend full doses. For this purpose the infusion is better than the tincture, in doses of from half a drachm to a drachm once or twice a day; the effects being watched, the remedy to be suspended if any signs of an overdose appear, or its use intermitted for a time when relief is apparent. If the tincture be used, dose 10 to 15 drops. Application of the tincture or infusion to the abdomen, as recommended by Christison, Joret (7, p. 351), and others, the writer has found a useful mode in dropsy.

Weakened heart, independent of any organic change or sequence of inflammation, shown in inequality, quickness, and intermittence

of pulse, and facility of being easily increased by emotion and exercise, is for a time benefited by small doses of Digitalis. It is sometimes most troublesome to remove when connected with latent gout; colch., nux v., plumb., naja, sul., are then better indicated than Dig., and when dependent on uterine or hysteric affection it gives place to aur., bell. or atrop., con., cocc., camph., iod., val., mosch.

When occurring with anæmia or nervous exhaustion, Dig. is occasionally useful as an intercurrent to such remedies as chin., fer., phos. ac., ars., ver., plumb. In low cachectic states, independent of syphilis, I have had good results from iod. where Dig. had failed.

In many cases of *Weak and Irritable Heart* the cause is probably deranged action of the vagus, hence the failure of Dig. under these circumstances, for its strongest affinity is to the myocardia.

Weakness of heart is present in *Exophthalmos* or Basedow's disease, here Dig. is well indicated (*vide* in addition to heart symptoms, *P.* No. 10, and Eye Section). The writer found it useful in relieving the condition of heart and removing cardiac pain in the case of a young lady suffering from this disease; dose 3 to 5 drops given two to three times a day. In fatty degeneration of heart Dig. is a partial help, but for the general state inferior to ars., phos., naja, bar. c. The great tissue changes fatty degeneration leads to are shown in the condition of the arteries and arterioles, aneurisms, &c., but whether from this or chronic arteritis there is no clinical evidence of the value of Dig., probably ars., phos., iod., bar. c., are more indicated.

Fatty Deposition on Cardiac Muscles, which leads to detriment of power, is more likely to be relieved by diet and regimen than by medicines, and of these arnica is more likely to be useful than Dig., at least such was Liedbeck's experience in his own case. In *Irritable Heart* Da Costa strongly recommends it, ten minims of tincture twice daily; useful in proportion as hypertrophy is absent. The description quoted by Ringer from Da Costa of this affection is a very correct picture of the pathogenesis of Digitalis, except in the constant presence of pains (19, p. 462).

Cardiac Pain, as long as it does not assume the paroxysmal form, has a good remedy in Dig.; compare with ars., arn., cact., spig., naja, phos., plumb.; Hughes names hydrocyanic acid and cuprum, Jousset nux v. with hæmorrhoidal tendency.

Fever. Temperature.

228. Sense of heat in nape of neck and back, soon spreading over all the body; hot skin, rapid pulse, swollen veins, vision disturbed.—*Ex.* 14.

229. Painful sense of heat all over, but no thirst, attending digestive derangements.—*Ex.* 8*c*.

230. Sense of heat all over the body, especially towards the head; rapid pulse, nausea, painful feeling of hunger, and stomach derangement, passing into a marked febrile condition attendant on gastro-intestinal catarrh and brain irritation.—*Ex.* 1.

231. Shivering and extreme weakness, pulse 60, weak and irregular.—*Ex.* 1.
232. Shivering three to four times in the afternoon, at night profuse sweating.—*H.* 395.
233. Chill, followed by heat and dryness of the skin, then pains in the legs.—*Ex.* 1.
234. Constant chilliness, unable to get warm when walking in the open air.—*H.* 397.
235. Chilliness, chiefly in the back.—*H.* 398.
236. Slight shivering, followed in two hours by unusual heat in hands and feet; restless night, pulse 68, irregular.—*Ex.* 8*b*.
237. Heat and sweating of face and back, pulse quick.—*Ex.* 14.
238. Heat and redness of the head and face, with chilliness of back or over the rest of the body.—*H.* 410, 411.
239. Skin icy cold all over, face pale, temperature under normal, pulse 52, irregular, intermittent.—*P.* Nos. 5, 10.

Commentary.

The pyrexia of Dig. is not well marked; it is more quickness of pulse than rise in temperature after moderate doses. The power of Dig. in very large doses to reduce the temperature has led to its employment in inflammatory affections and enteric fever, not with satisfactory results. It always lowers the pulse before affecting the temperature. A sudden fall or weakening of pulse demands its suspension.

Lobethal narrates a case of febris nervosa where the occurrence of marked ptyalism led him to use Dig., and with good success. Trinks and Rückert have used it in enteric and typhus fever.—*Br. J. Hom.*, 1874, p. 316.

Neck and Back.

240. Drawing aching in occiput at the attachment of cervical muscles, on bending the head.—*H.* 86.
241. Nape of neck is stiff and painful.—*Ex.* 10.
242. Sense of heat in nape of neck soon spreading over the body.—*Ex.* 14.
243. Sudden rheumatic aching in left side of neck and left arm.—*Ex.* 10.
244. Head falls backwards, as if the muscles had no power.—*H.* 37.
245. In the left side, in the region of the lumbar vertebræ, drawing cutting pain, which is relieved by pressing on it with the hand.—*H.* 265.
246. Drawing in the spine, the limbs, and fingers, as sometimes after a chill.—*H.* 266.
247. In the first dorsal vertebra a sensation like a blow.—*H.* 267.
247*a*. In the junction of the first dorsal and last cervical vertebræ, the joint pains as if excoriated on bending forward the neck, but not on touching.—*H.* 268.

248. Cutting pain, with numbness of the skin, in the upper part of the nape, which compels the head to be drawn backwards.—*H.* 270.
249. Tearing pains and stitches under and between scapulæ.—*H.* 272, 273.
250. Lumbago.—*Ex.* 8*b*.

Commentary.

Homolle considers S. 250 only to be accounted for by the digitaline. Bähr's experiments showing the myalgic properties of Dig. confirm this.

Upper Extremities.

251. Unusual sense of heat in hands and feet, with agitated sleep, preceded by slight shivering; pulse very irregular.—*Ex.* 8*b*.
252. Sudden rheumatic pains in left arm and side of neck, hindering movement.—*Ex.* 10.
252. Severe articular pains like rheumatism, with debility.—*Ex.* 12.
253. At night violent pain in the left shoulder and elbow-joints, in half sleep, in which the consciousness was not quite clear, whilst he lay on his back with the left arm above the head.—*H.* 372.
254. Sudden throbbing pain in right elbow extending from external condyle upwards, very violent for a time, then decreasing.—*Ex.* 10.
254*a*. Pressive pain in left elbow and wrist, weight in right arm.—*Ex.* 14.
255. Pressive throbbing pain in left shoulder and in arms which feel weak, headache and coryza.—*Ex.* 10.
256. Great weakness of arms, trembling, rendering writing difficult.—*Ex.* 10.
257. Paralytic weakness in the left arm; he could scarcely raise it up or close the fingers to make a fist without pain.—*H.* 275.
258. Heaviness in the left arm, also felt when at rest.—*H.* 277.
259. In the arms a burning shooting sensation.—*H.* 278.
260. A painful twitching beating in the flesh of the upper arm and thigh.—*H.* 279.
261. Tearing stitches on the right upper arm when walking.—*H.* 280.
262. Paralytic tearing in right wrist and the finger-joints.—*H.* 288, 293, 294.
263. The hand swollen at night, lasting three hours.—*H.* 284.
264. Pinching sharp shooting behind right wrist-joint.—*H.* 285.
265. Severe tearing on right forearm, when moving and at rest.—*H.* 288.
266. Drawing-asunder pains in fingers and toes, relieved by exercise.—*Ex.* 14.
267. One hand cold, the other warm.—*H.* 406.

Lower Extremities.

268. Transient cutting pains in left hip-joint.—*Ex.* 12.
269. Numbness of the nates when sitting in the evening.—*H.* 297.
270. Twitching and tension in the houghs, not permitting of their being straightened.—*H.* 313, 314.

271. Penetrating pains in the joints.—*H.* 324.
272. Severe articular pains, like rheumatic, with muscular debility.—*Ex.* 12.
273. Joints are painful, as if broken on the wheel, after siesta.—*H.* 325.
274. Burning in right calf as soon as he lays it over the other leg.—*H.* 319.
275. Drawing pain in both legs, especially left, worse when sitting.—*Ex.* 14.
276. On crossing the lower extremities one over the other, cutting sensation in the thigh, which goes off on uncrossing them.—*H.* 305.
277. Cramp-like drawing in the muscles above the hough when sitting, which goes off after walking a little.—*H.* 306.
278. After lying when he moves the knees, on commencing to move, the thighs and legs and sacrum are painful, as if bruised.—*H.* 307.
279. Pressive pain in parts of muscles of leg, quickly changing site.—*Ex.* 14.
280. Pains in calves and knees with first chilly feelings, then heat and dryness of the body.—*Ex.* 1.
281. Throbbing drawing in region of left tensor fasciæ latæ.—*Ex.* 10.
282. Violent cramp-like, drawing pains from toes through left leg, similar pains in thorax.—*Ex.* 10.
283. In the evening, acute, sharp stitches in right side so that the whole leg twitches.—*H.* 323.
284. Pains in feet and toes, worse when sitting, partially relieved by walking.—*Ex.* 14.
285. Drawing asunder pains in toes of left foot, relieved by walking, similar pains in fingers.—*Ex.* 14.
286. Sharp drawing in the toes.—*Ex.* 14.
287. Sense of prostration, of great fatigue in the legs, as after a long walk, especially in the joints.—*Ex.* 1, 10, 12, *H.* 311, 312.
288. Great weakness and trembling, paralytic feeling of limbs.—*Ex.* 10, *H.* 334, 335.
289. Constant stretching of the feet, compelled by the weariness.—*H.* 316.
290. Sense of powerlessness in legs, with tearing pains in ankles.—*Ex.* 10.
291. Unusual sense of heat in feet and hands.—*Ex.* 8*b*.

Commentary on Upper and Lower Extremities.

Bähr has the merit of having first called attention to Dig. as a remedy in *acute articular rheumatism*, having been guided to this by the similarity of the symptoms in his own experimenis. S. 252, 253, 254, 263, 271, 272. Stadion's (Ex. 12) point in the same direction. Bähr is unable to give any special indications for its use, because he has not had sufficient opportunities to test it. The occurrence of certain cardiac conditions would be an indication; he hints—shining white swelling of the joints, many joints attacked at once, the body very pale. He has given it as the sole remedy, and ranks it high as a rheumatic remedy.

Royston Fairbank recommends the external use of Dig. in acute inflammation of joints, acute inflammation of leg from varicose ulcers, severe inflammation of breast, and erysipelas. He employs a fomentation, made by adding a teaspoonful of leaves in half a pint of boiling water, or ʒj of tr. to ℥viij aq. (19, p. 479).

General Symptoms.

292. Sense of great lassitude, headache and fatigue.—*P.* No. 5.
293. All his muscles feel relaxed, as if he had not slept enough.—*H.* 342.
294. Feels bruised all over.—*P.* No. 5.
295. Great muscular debility, attended by severe pain in the joints.—*Ex.* 12.
296 General feeling of chilliness.—*P.* No. 5, &c.
297 Sinking of the vital powers.—*H.* 338.
298. Rapid wasting of the body and depression of the exchange or material.—*Ex.* 12.
299. General collapse, as in cholera.

Commentary.

The general condition produced is one of great muscular debility, with tendency to syncope.

It has been recommended by Dr. Morgan for collapse after shock or injury. Indications—slow pulse, bluish paleness, inactivity of the pupil, optical illusions.—(*Surgical Therap.*, *Amer. J. Hom. Mat. Med.*, Oct., 1871.)

It is indicated in all cases of collapse due to failure of heart's action; additionally indicated where this is due to uterine hæmorrhage when its power to contract this organ comes powerfully to aid.

KALI BICHROMICUM.

BY

J. J. DRYSDALE, M.D.

KALI BICHROMICUM.

Abbreviations.—K.-bi., K. bich., Kali b.

Chemical.

Chromic Acid CrO_3 unites with nearly all bases. The salts are for the most part easily crystallizable, and isomorphous with the corresponding sulphates. The chromates of the alkali-metals, and of strontium, calcium, and magnesium are soluble in water; the others are insoluble, or sparingly soluble. The salts of chromic acid are all red or yellow, the former tint predominating whenever the acid is in excess. Part of them are decomposed by simple ignition, and all by the united agency of heat and combustible matter.

Chromates of Potassa.—I. Normal Potassium Chromate, or Yellow Chromate of Potash, K_2CrO_4, K_2O, CrO_3, 194·5, consisting of 100·4 parts or 1 eq. of Chromic Acid, and 94·1 parts, or 1 eq. of Potassa. This salt is obtained by the addition of potash to a solution of the Bichromate. On evaporating the solution yellow, double, six-sided pyramids belonging to the trimetric system crystallize out, which are isomorphous with potassium sulphate and crystallize with the latter salt in all proportions. It has a pale lemon-yellow colour, an alkaline reaction, and a cooling, persistently bitter taste; it is poisonous even in small doses. It has a specific gravity of 2·705, and it does not undergo alteration in the air. On heating it becomes red-coloured, and melts at a high temperature without decomposition, solidifying on cooling to a crystalline mass. It is not decomposed by simple ignition, but when heated to redness in contact with charcoal, sulphur, sal-ammoniac, and other reducing agents, it forms chromic oxide together with a potassium salt. It dissolves in water with a yellow colour, which is perceptible, even when very small quantities of the substance are present, one part of the salt imparting a distinct yellow tint to 400,000 parts of water; and a deep yellow colour to twenty parts of nitre when crystalized therewith. One hundred parts of water dissolve:

At	0°	20°	60°	100° C.
K_2CrO_4	58·90	62·94	71·02	79·10 parts.

The saturated solution boils at 104·2° C. On evaporating its solution red crystals of the dichromate are first deposited and afterwards the yellow crystals of the neutral salt. It is decomposed by all acids, even by carbonic acid with formation of the dichromate. Sulphydric acid and sulphide of potassium decompose it with formation of chromic hydrate; sulphurous acid forms at first brown oxide of chromium, then a chromic salt. It is insoluble in alcohol, and is precipitated by alcohol from its aqueous solution.

II. Potassium Dichromate, or Bichromate of Potash, Red Chromate of Potash, $K_2Cr_2O_7$, $K_2O_2CrO_3 = K_2CrO_4$, CrO_3, 294·9, consisting of 200·8 parts, or 2 eq. of Chromic Acid, and 94·1, or 1 eq. of Potash. This salt serves as the point of departure for the preparation of almost all the other chromium compounds, and is prepared on the large scale from chrome-iron-ore. The chrome-iron-ore is first roasted and four and a half parts of the finely ground ore mixed with two and a quarter parts of potassium carbonate, and seven parts of lime. This mass after

drying at 150° is heated to bright redness with an oxidizing flame, the whole being constantly stirred. At the end of the operation the charge is withdrawn from the furnace, and, after cooling, it is lixiviated with the minimum amount of hot water. The liquor is next treated with the requisite quantity of sulphuric acid, diluted with twice its volume of water, to convert the chromate into dichromate, and then allowed to cool. The solution of chromate saturated at 16° contains nearly one part of salt to two parts of water, whilst the dichromate requires ten parts of water for its solution. It is clear, therefore, that when the saturated solution of chromate is converted into dichromate, a precipitate of about three quarters of the dichromate will be formed on cooling. This precipitate is collected and then recrystallized, whilst the mother liquor is used for the lixiviation of another portion of the roasted mass.

Potassium dichromate crystallizes in splendid garnet-red tables or prisms belonging to the triclinic system, having a specific gravity of 2·692. It is permanent in the air, reddens litmus, has a cooling, bitter, and metallic taste. It melts below a red heat, forming a transparent red liquid, which when slowly cooled solidifies in crystals which have the same form as those deposited from aqueous solution, but crumbling to powder at lower temperatures. It decomposes at a white heat into oxygen, chromic oxide, and the neutral salt. Heated with charcoal it is reduced with slight detonation: paper or calico, saturated with the solution and dried, burns like tinder when heated. Heated with strong sulphuric acid it gives off oxygen (about 16 per cent. by weight) and yields water and potassio-chromic-sulphate. It is reduced when heated with sulphur or sal-ammoniac. Sulphydric acid precipitates from its solution a mixture of chromic oxide and sulphur. Sulphurous acid colours it green without forming any precipitate, from formation of chromic sulphate and hyposulphate. A solution of the salt in boiling hydrochloric acid deposits on cooling a chromo-chloride of potassium. The solution of the bichromate absorbs a considerable quantity of nitric oxide, acquiring a dark colour and depositing, after a while, brown oxide of chromium. A concentrated solution of the acid or bichromate mixed with strong sulphuric acid yields a deep red precipitate of chromic acid. One hundred parts of water dissolve:

At	0°	10°	40°	80°	100° C.
$K_2Cr_2O_7$	4·96	8·47	29·15	73·00	102·04 parts.

The saturated solution boils at 104° C. It is insoluble in alcohol. The commercial salt is usually almost chemically pure, and is employed for the preparation of the other chromium compounds, as a reagent, and as an oxidizing agent, as well as being largely used in dyeing and calico-printing. A film of organic matter, saturated with a solution of potassium dichromate, acquires a dark colour on exposure to light owing to a reduction to chromic oxyde taking place, and a solution of this substance in gelatine is used as a sensitive agent in the autotype, and other similar photographic printing processes.

The oxidising properties of potassium bichromate make it a most valuable reagent in volumetric analysis.

III. Potassium Trichromate, $K_2Cr_3O_{10}$, crystallizes in dark red nacreous prisms, when a solution of the dichromate in ordinary nitric acid, or in an aqueous solution of chromium trioxide, prepared at 60°, is allowed to cool. These have a specific gravity of 3·613, melt at a temperature of 150°, and gradually become black on exposure to air.

IV. Potassium Tetrachromate, $K_2Cr_4O_{13}$, is obtained in the form of thin glistening red scales, when the foregoing salt is heated for some time with concentrated sulphuric acid.

Sesquioxide of Chromium.—Chromic oxide Cr_2O_3, 152·8 containing 2 eq. of chromium and 3 eq. of oxygen. This is the common green oxide of chromium. As this also may be used in medical practice, I give a convenient mode of preparing it pure. A solution of the bichromate is to be strongly acidified with sulphurous acid, then boiled and precipitated with a very slight excess of ammonia. The hydrated sesquioxide of chromium is now filtered off, thoroughly washed with boiling water, and dried at 100° C.

Chromic Chromate.—$Cr_2O_3 . CrO_3 = 3\ CrO_2$. This compound is also known as chromium dioxide or peroxide. It is formed when chromic nitrate is gently heated; or by the precipitation of chromic salt with a soluble chromate. The brown powder

thus obtained is easily soluble in acids. If chromium chromate be washed for some time with water, it is decomposed into chromic acid and insoluble sesquioxide.

Tests.—Chromic acid may be reduced to sesquioxide by boiling with sulphurous acid; by heating with strong hydrochloric acid, or with the dilute acid and alcohol (with formation of chloride of ethyl and aldehyde) by metallic zinc; by heating with tartaric acid, oxalic acid. All these reactions are most clearly characterized by the change of the red or yellow colour of the solution to the green or violet tint of the salt of sesquioxide of chromium.

If insoluble chromates are fused with carbonate of soda and nitrate of potassium, and the mass extracted with water, a yellow liquor will be obtained from the dissolved alkaline chromate.

Chloride of Barium produces, in aqueous solutions of chromates, a yellowish-white precipitate of chromate of baryta, soluble in dilute hydrochloric and nitric acids.

Nitrate of Silver produces, in aqueous solutions of chromates, a dark, purple-red precipitate of chromate of silver, soluble in nitric acid, and in ammonia; in slightly acid solutions it produces a precipitate of bichromate of silver.

Acetate of Lead produces in an aqueous or an acetic solution of a chromate a yellow precipitate of chromate of lead, sparingly soluble in dilute nitric acid, insoluble in acetic acid. Upon heating with alkalies, the yellow neutral salt is converted into basic red chromate of lead.

If a very dilute acid solution of *peroxide of hydrogen* (abt. 6 or 8 c.c.) is covered with a thin layer of ether, and a fluid containing chromic acid is added, the solution of peroxide of hydrogen acquires a fine blue colour. By inverting the test-tube, closed with the thumb, repeatedly, without much shaking, the solution becomes colourless, whilst the ether acquires a blue colour. The latter reaction is particularly characteristic. One part of chromate of potash in 40,000 parts of water suffices to produce it distinctly. The presence of vanadic acid materially impairs the delicacy of the test. The blue colouration is probably caused by a combination of chromic acid with peroxide of hydrogen. After some time reduction of the chromic acid to sesquioxide takes places, and at the same time decoloration of the ether.

Very minute quantities of chromic acid may be detected by one of the following methods: *a.* mix with the fluid, slightly acidified with sulphuric acid, a little tincture of guaiacum (one part of the resin to 100 parts of alcohol of 60 per cent) when an intense blue colouration of the fluid will at once make its appearance, speedily vanishing again, however, when mere traces of chromic acid are present. *b.* Mix the solution of the alkaline chromate, which must be as neutral as possible, with some dilute decoction of logwood, when a very intense black colouration will be produced; in the presence of exceedingly small quantities of chromic acid the colour is violet-red.

The following observations are furnished by Mr. George Paterson, analytical chemist, Liverpool:

"With *vaseline* I found that the vaseline exercised no *solvent* influence upon the bichromate when in the state of the finest powder. I had melted the vaseline in a beaker immersed in hot water, but vigorous agitation and constant stirring did not suffice to effect even any intimate mixture, the bichromate always remaining by itself in the bottom of the beaker. I next allowed the vaseline to solidify, and then attempted mixing with a knife, but this too was quite unsatisfactory, the mass being merely spotted throughout with red dots of the chromate. Two grains of bichromate were now dissolved in a few drops of water, and this solution added to one ounce of fluid vaseline. The chrome solution settled again at the bottom, and would not mix or incorporate itself as long as the vaseline remained fluid. When, however, the vaseline became solid, simple stirring with a glass rod soon effected the most intimate mixture. I find, too, that the vaseline is without any chemical action upon the bichromate.

Hence vaseline is suitable for making an ointment with K. bich.

With *Glycerine.*—I think this may be somewhat summarily dealt with. I found that one c.c. of a saturated bichromate solution mixed perfectly with an equal volume of glycerine, but that the salt decomposed immediately on the application of heat, or on the addition of a drop of a free mineral acid. Left by itself, *i.e.* without the addition of acid or heat, for a short time (half hour) it was almost completely decomposed. I obtained precisely similar results using similar solutions, but increasing the volume of water each time by one up to four (*i.e.* one bichrom., one glycerine,

4 aq.) the only difference being that the more dilute solutions took the longer time for spontaneous decomposition.

With *Alcohol*, or spirit of wine. In this case my first experiment was to determine the absolute solubility of the salt, and my first trial was with *absolute* alcohol. This I find exercises little or no solvent influence, 100 c.c. of absolute alcohol, at 20° C., dissolve only ·014 grm. of bichromate, *i.e.* ·014 per cent. The next experiment I made with ordinary spirit of wine 90 per cent., and I find that at the common temperature (20° C.) 100 c.c. dissolve ·086 grm. of bichromate or ·086 per cent. Hot spirit, boiling, dissolves *very considerable* quantities of bichromate, which crystallises out again upon cooling. A saturated spirit solution cannot be kept even in the cold without decomposing, a brown precipitate forming until the *whole* of the chromic acid is separated. I found the same result took place in a saturated spirit solution to which an equal volume of water had been added.

Hence the dilution should be made with water up at least till the 3rd centesimal.

With *Lard.*—One ounce of lard was melted in a glass beaker, and ten grains of dry powdered bichromate added whilst it remained fluid. The beaker was then replaced in a drying oven, temp. 100° C., and kept constantly stirred and agitated for half an hour. By the end of this period the clear and colourless lard had become deeply tinted with yellow, showing that a portion of the bichromate was completely dissolved in it, though by far the greater part remained still undissolved in the bottom of the vessel. I found, as in the case of the vaseline, that when the mass became less fluid, a most intimate mechanical mixture was easily effected by prolonged stirring with a glass rod, and *the bichromate is not in the slightest degree decomposed by the lard.*

Hence lard is suitable for making an ointment of K. bich.

With *Sugar of Milk.*—A most intimate mixture of 10 grains of bichromate with 100 grains of sugar of milk was easily effected by trituration in a dry mortar, and the mixture was observed to be perfectly stable. A portion of this mixture dissolved in a small quantity of water is not decomposed by prolonged boiling, or upon long standing. The presence of a little free acid effects a speedy reduction, however, even in the cold."

Chemical antidotes.

In cases of poisoning with the bichromate, Dr. Ducatel first proposed a solution of carbonate of soda or potash. Buchner recommends a mixture of bicarbonate of soda and hydrated peroxide of iron. Berndt tried the carbonate of potash in five animals poisoned with chrome, and three died; but he does not think the two that recovered were saved by antidotal power, as the poison was most likely all ejected by the vomiting, and besides, as we know, the neutral chromate is not much less poisonous than the bichromate. As the peroxide of iron gives an insoluble precipitate with the chrome salts it seemed a more likely antidote, but it was given to three rabbits without success: a scruple of the bichromate was given to each, and soon after an ounce of the oxide, yet they all died in from three to five hours, and in the stomach some of the chrome salt was still detected. The tincture of galls was also tried without success. The acetate of lime has also been proposed as a chemical antidote. Mr. Alfred Taylor recommends carbonate of magnesia, or lime, in linseed tea, and also suggests the trial of brown sugar dissolved in water at 102°, which reduces the chromic acid to the state of oxide of chrome. Chemical antidotes, however, can be of little avail unless administered within a few minutes after the poison is swallowed: and it may be added none of the above are of tried efficacy nor promise much success, so the chief reliance must be placed on removing the poison with the stomach-pump and by vomiting. Milk, albumen, and chalk may also be given.

Literature and sources of information.

The first notice of the action of this substance on the animal organism seems to be in the experiments of Gmelin of Tübingen in 1824. Then Dr. Cumin of Glasgow in 1827 observed its poisonous effects on the workmen engaged in its preparation, and also suggested its use and occasionally employed it as a caustic. In 1841 and 1842 it was used by Hauche and Jacobson in Germany as a caustic and external application in eruptions, &c. In 1844 the first homœopathic proving was published by me, with experiments on animals and observations on the workmen, in the *British Journal of Homœopathy* for that year. In 1845 the Austrian Proving Society undertook the additional proving of this drug, and the results of their labours are published in the *Austrian Journal of Homœopathy* for 1847, vol. iii, p. 252, by Dr. Arneth, who has incorporated into this in the most complete manner all that was known upon the subject up to that date. To save constant reference, I may say here that I have endeavoured to incorporate in the following pages all the information contained in Dr. Arneth's treatise, and have frequently also adopted the opinions and remarks of Dr. Arneth.

Since the appearance of the second edition we have several valuable additions to the literature of the subject, viz. :

Heathcot, *Lancet*, 1854, "Case of Chronic Sore throat."

"Emploi de l'acide chromique, &c.," *Bull. gen. de Therap.*, 1857, and 1872, 1869, 1873.

Becourt et Chevallier, "The Effects on the Workmen in K. bich.," *Annales d'Hygiene*, 1863.

J. Bruck, "Ueber die Cromsäure, &c.," *Deutsche Klinik*, xv, 1863.

Delpech et Hillairet, "Effects on the Workmen," *Annales d'Hygiène publique*, 1869 (Del. and Hil.).

"Experiences sur les sels de Chrome par Commaille, *Rec. de mem. de med.*, xxiv, p. 252.

Gergens, "Toxische Wirkung, &c.," *Arch. f. exper. Path. &c.*, Leipzig, 1876, Bd. vi, p. 148.

Hairion, "Emploi de l'acide chr. dans l'ophthal. granuleuse," *Ann. d'Oculistique*, Brux., xxxix, p. 213.

John Priestley in the *Journal of Anatomy and Physiology*, xi, p. 285.

Mayer, "Versuche über die Aufnahme des Chroms in das Blut, &c.," *Med. Jahrb.*, Wien, 1877, p. 138.

Cases of Wickens, Ogston, Gurnsey, Schrader, Quillard and Dusterburg, given in *Allen's Materia Medica.*

"Sur l'action toxique et sur l'emploi therapeutique du bichromate de potasse," par M. Vulpian, *Journal de Pharmacie et de Chimie*, Sept. et Oct., 1883.

"Dernière Maladie de M. le Comte de Chambord," par M. Vulpian, *Gazette Hebdomad. de Med. et Chir.*, 14th Sept., 1883.

The number of persons who have been the subjects of the following observations and experiments is very considerable. Of these, it is quite unnecessary to give the names and abbreviations of all the individuals, as in many cases little is known of the workmen except their names and the symptoms reported; it is sufficient to say, that the workpeople on whom observations were made were all males, and of ages varying from sixteen to seventy. Any observation as to the influence of temperament, &c., on the action of the drug among the

workmen, must be taken on the authority of those who furnished the observations, as we have not the means of proving it numerically.

The names and abbreviations of the voluntary experimenters here, and in Austria and America, are as follow—comprising eleven males and five females already named in the *British Journal of Homœopathy* in 1844, and twelve males and two females named in the *Austrian Journal*, 1847.

A. B., an unmarried female, aged 23, of sanguine lymphatic temperament. (*A.B.*)
Dr. Arneth, aged 25, of choleric temperament and strong constitution. (*A.*)
Dr. Drysdale, aged 28, nervous sanguine temperament. (*Dle.*) Three provings.
Dr. Dudgeon, aged 25, nervous sanguine temperament. (*Dgn.*)
Dr. Hamilton, sanguine temperament. (*Hln.*)
Joseph King, a young man of lymphatic temperament, with red hair. (*Kg.*)
Mr. K., aged 30, of nervous lymphatic temperament. (*K.*)
K. K., aged 30, a female, brunette and of choleric temperament. (*K. K.*)
Kostler, a medical student.
Lackner, aged 23, bilious nervous temperament. (*Lk.*)
M. J., aged 21.
Dr. Marenzeller, aged 26, sanguine nervous temperament, spare habit. (*Mz.*)
Dr. Mayerhofer. (*Mr.*)
Dr. Müller, aged 37, tall and slender, bilious temperament, disposition to hæmorrhoids. (*M.*)
N., an unmarried girl, aged 18, bilious temperament, black hair, soft disposition, of a chlorotic complexion, and irregular menstruation.
Dr. Neidhard, dark hair, strong frame.
Dr. Norton, aged 32, tall, fair haired, lymphatic temperament. (*Nn.*)
Dr. Reisinger, aged above 30, lymphatic temperament, strong frame.
Dr. Russell, aged 28, fair hair, sanguine nervous temperament. (*Rll.*)
Dr. Schlesinger, aged 30, sanguine temperament, disposed to coryza and hæmorrhoids, but of good health.
Dr. Schwarz, aged 30, sanguine temperament, somewhat stout, and of excellent health. (*Sch.*)
J. Taylor, aged 26, bilious sanguine temperament. (*Tyr.*)
Henry Turner, aged 31, sanguine lymphatic temperament. (*H. T.*)
Dr. Walker, aged 29, bilious sanguine lymphatic temperament. (*Wkr.*)
X. Y., an unmarried female, aged 30, sanguine lymphatic temperament.
Prof. Zlatarovich, aged 38, of strong constitution, dark complexion, sanguine nervous temperament. (*Zl.*) Two provings. In youth had intermittent fever, and when 29 had typhus, subject to hæmorrhoids.
Dr. Schelling, in perfect health inhaled the dust of K. bich. while triturating it. (*Schg.*)

The dose is generally noted accurately at the end of each group of symptoms, but sometimes it is less definitely indicated. Anything beyond the second dilution being named infinitesimal dose (*inf. d.*), and the immediate fractions of a grain above one fifth, or more than one grain, being called strong dose (*s. d.*). When dilution is mentioned the centesimal is always meant: the first and second dilutions are sometimes indefinitely indicated as low dilutions (*l. d.*).

The form in which the medicine was taken by the voluntary provers was that of aqueous solution or of trituration with milk-sugar, in the proportion of 1 grain of the salt to 100 drops or grains of the water or sugar respectively.

The workmen are exposed to its influence chiefly in the form of solution, of vapour arising from the solution, of dust of the salt, and of the chrome ore. I have placed most reliance on the cases of those employed in packing the perfect salt, as they are exposed to the influ-

ence of the salt in its purest form, viz. the dust of the crystals necessarily inhaled in the process.*

Results of the experiments on the lower animals.

Our knowledge of the morbid appearances produced by this substance, as far as can be ascertained from experiments on the lower animals, is tolerably complete, being derived from forty to fifty experiments with the neutral salt and the bichromate on various animals, but chiefly dogs and rabbits. The first experiments made known were those of Gmelin (see *Wibmer, Arzneimittel und Gifte*, Bd. iv, p. 313), next my own with the bichromate (published with plates in Vol. II, of the *British Journal of Homœopathy*), then those of Zlatarovich, Schlesinger and Norton (in the *Austrian Journal*), and lastly those by Berndt (*Frank's Magazin*, vol. i, p. 34). As all these experiments are narrated or quoted in full in the Austrian proving so often referred to, it is unnecessary to give them literally here—it will be sufficient to give a summary of the results. The experiments may be divided into three classes :—1st, those that proved fatal within less than ten or twelve hours; 2nd, those fatal between twelve hours and two or three weeks; and 3rd, those that lasted from one to two months.

The first class furnishes few facts of practical interest. As regards the quantity : in different experiments, 3, 6, 12, 30 grains produced no further effect than their ejection by vomiting; while in others, from 30

* In selecting the groups of symptoms which compose the following register, I have subjected the narratives of the experimenters to what may appear somewhat rigid criticism; and in the fear of incorporating any useless or doubtful symptoms may have left out many that really belong to the drug, and which may turn out to be valuable. But I hold that it is better to reject many real symptoms than admit one false one, as one false symptom tends to vitiate the whole, by destroying our confidence in the rest. In most cases I have not admitted any marked phenomena on the evidence of one experimenter, but only adopted such symptoms as agree in several. I have also omitted the greater part of the experiments of some provers, in consequence of the want of sufficient information as to the constitution or habits of the prover, or from direct evidence of their doubtful character. Thus a most formidable group of symptoms, including total blindness for a short time, is given by one experimenter; but as we have no information as to his constitution, and are told he had a headache before beginning to take the medicine, we cannot adopt his results till they are confirmed, as for all I know he may be subject to sick headaches, preceded by loss of sight, as in this case. The proving of Dr. Wachtel I have also taken the liberty to omit entirely. This gentleman took one dose of the 12th dilution only. Sixteen days thereafter he had a tickling cough, and spat up during the day, on the whole, about half a pound of bright red blood: next day he discovered a small fissure in the posterior wall of the pharynx, from which the blood had exuded. Further evidence is certainly required to establish any connection between these phenomena and the dose of K. bich. I have omitted also some of the symptoms of the excellent and indefatigable Professor Zlatarovich; as on comparing them with his own symptoms, while under the influence of other and very dissimilar medicines, they were very much the same. It is certainly very much to be desired that each experimenter should hand in at the same time with his narrative a critical analysis of it, pointing out or expunging those symptoms which from knowledge of himself he considers may be doubtful. Till that is done we cannot attain to accuracy, for it is impossible for anyone afterwards, at a distance of time and space, to subject the narrative to a sifting cross-examination, such as might be practicable on the spot; all that can be done is to omit in each what is not confirmed by the narrative of some other experimenters.

to 60 grains of the neutral, or 10 grains of the bichromate, were fatal in dogs and rabbits in from half an hour to three hours. A solution of ten grains injected into the jugular vein of a dog produced instant death. The appearances found in these rapid poisonings were: the mucous membrane of the stomach was found violently inflamed in all its extent except the pyloric portion; or there were brown, or brownish-red, or even blackish spots in several places, and the membrane was partly destroyed. The ileum injected. Red spots in the cæcum. Trachea vascular or bronchia and lungs full of blood, and in one the lower lobes said to be inflamed. Heart containing dark coagulated blood. Brain and spinal marrow full of blood, and soft.

In Priestley's experiments the neutral chromate of sodium was employed. Six rabbits, two frogs, and one guinea-pig were used. The drug was injected under the skin or into the veins, and caused death rapidly. "·1 to ·3 gr. of CrO_3 in the form of neutral chromate of soda is a powerful poison for rabbits and guinea-pigs, producing death in four to thirty minutes if injected into the veins, and from forty to fifty minutes when introduced beneath the skin."

Death was preceded by spasms or convulsions and violent retching. Convulsions are varied with, or succeeded by paralysis of motion in mammals and in frogs, as is usual, of respiration also. In frogs the power of reflex action is speedily abolished.

"The blood-pressure generally rises at first, but in three quarters to three minutes begins to fall and continues to fall till death. Meanwhile the pulse preserves a strict normality save that as the blood-pressure falls it becomes somewhat deeper, owing to the larger excursion of the laxer arterial walls." After a time, however, the pulse begins to slip a beat at intervals. These phenomena Priestley thinks exclude the possibility of a cardiac origin for the fall in blood-pressure; nor does it depend on direct action on the coats of the arteries; we must therefore refer it to disturbance of the vaso-motor centre. The slips in the heart-beats he refers to stimulation of the vagus in some part of its course, because they did not occur in one rabbit in which the vagi were divided, while they happened invariably where these were intact. The point stimulated is the spinal centre of vagus. Vulpian agrees generally with Priestley's interpretations of these phenomena.

Post-mortem.—The wound showed greenish-yellow colouration of the cellular tissue owing to reduction of this drug. The *stomach* exhibited much congestion at the back and cardiac end of a cherry colour. Ecchymoses externally and internally. Arborescent injection of chocolate-coloured blood at the pyloric end externally. The *duodenum* showed the mucous membrane congested and chocolate-coloured injection externally. Slight congestion all through the small and large intestines. Liver cherry-coloured on and throughout its mass. Kidneys congested with cherry-coloured blood. Heart, stoppage in diastole, blood chocolate colour, coagulated normally, and showed absorption bands resembling those of methæmoglobin.

In Meyer's experiments, from 2·5 to 7 cubic centimetres of a solution of one of chromic acid to two of water were injected into two dogs subcutaneously. Death in about four hours, preceded by vomiting,

retching, diarrhœa, restlessness, twitching of extremities, sopor, and convulsions. Blood drawn from the veins at intervals showed in both the presence of chromic acid. P.M.—Injection, swelling of mucous membrane of stomach and small intestines, the latter partially filled with reddish, opaque, shiny masses, consisting of intestinal epithelium; ecchymoses near pylorus. Kidneys full of blood and ecchymoses of mucous membrane of bladder; urine albuminous and turbid.

In Gergens's experiments on dogs the chromic acid was injected into the spinal cord through an opening previously made. This method is obviously unsuitable for ascertaining the specific effects of the drug as distinguished from those of merely chemical destruction of the cord. In some experiments, however, he injected chromate of potash subcutaneously and in rabbits without destruction of the cord. He also made two control experiments, in which a similar portion of the cord was acted on by mechanical means; and in these the kidneys were not affected as with the chrome. For these reasons we may agree that the kidney symptoms are to be accepted while the rest may be rejected. These were parenchymatous inflammation of the kidneys, ecchymoses on mucous membrane of bladder, with albuminuria and casts of renal epithelium. P.M.—Kidneys full of blood, ecchymoses on cortex, cortical substance yellow, medullary substance dark red, dimness and fatty degeneration of epithelium; no change in the interstitial tissue, therefore parenchymatous desquamative nephritis. In some cases injection and ecchymoses of vesical mucous membrane. In rabbits after subcutaneous injection of gr. 4 neutral chromate, death in twenty-four hours, with kidneys injected and many hæmorrhagic infarctus. Urine albuminous.

The second class furnishes the most important results. They are chiefly derived from the following experiments:*

No. 13, Gmelin's case.—3j of pulverised neutral chromate of potash was introduced into the cellular tissue of the back of the neck of a dog. Death on the sixth day.

15 (and three following), mine.—10 grains of the bichromate were inserted into the cellular tissue of the integuments of the abdomen behind the foreleg of a small dog. Death in 16 hours.

16.—Small and gradually increased doses were given by the mouth to a dog. At first half a grain dissolved in one ounce of water; this was gradually increased to 10 grains in the day, but as immediate vomiting was produced when the dose exceeded 2 or 3 grains, the quantity was diminished to that dose, and given twice a day till its death in 15 days.

17.—5 grains in an ounce of water once a day for 3 days, then twice a day. Death in 6 days.

18.—5 grains in 1 ounce of water daily, divided into three doses for 19 days. Then 5 grains were inserted into a wound as above, and the animal died next day.

22, 23, and 24, Norton's.—These were three dogs, all treated by strewing daily a quantity (undetermined) of the bichromate on a wound in the neck. Death took place in 6, 14, and 16 days.

* The plates referred to are in the appendix to No. vi (and vol.) of the *British Journal of Homœopathy*.

29, Schlesinger's.—2 teaspoonfuls of first dilution daily to a rabbit. Death in 14 days.

33, Berndt's.—30 grains of bichromate inserted into neck of a dog. Death in 11 hours.

33 *a*.—Vulpian experimented on five dogs, one rabbit, and severa frogs. Death in 2 to 5 days. In four dogs gramme 0·25 to 0·10 proved fatal injected subcutaneously, while one dog survived grm. 0·05. The rabbit died in 36 hours after grm. 0·08 with no symptoms but debility and no pathological appearances. The dogs showed vomiting, purging of mucus and blood, salivation, prostration, convulsive twitches and death; purulent mucus at eyes and nostrils. At the autopsy the wound showed no signs of inflammation, the muscles throughout coloured red as after poisoning with carbonic oxyde; yellow patches in the liver, like those after phosphorus poisoning, and at those parts the microscope showed fatty granulations in the hepatic cells. Kidneys red like the muscles; congestion of the mucous membrane of stomach and along the longitudinal fold of colon. In dogs Nos. 2 and 3 the liver was congested without any yellow patches. The experiments on frogs may be passed over as of no value.

With the exception of the ulcers in the primæ viæ, the effects were the same whether the salt was given internally or inserted into a wound. In several cases poisoned in this last manner, Berndt analysed the ejected matters, and also the contents of the stomach and bowels, and also the urine, without finding any trace of chrome in them. In those poisoned by the internal exhibition it was readily detected.

The symptoms usually manifested by the animals were—vomiting, violent and often incessant, renewed after drinking, at first ingesta then mucus frothy or bloody, and then dry retching. Pains and tenderness in the belly. Frequent purging of mucus and blood; quick pulse. At first great thirst, then the animals refused all food and drink. Salivation. Frequent micturition. Nose stuffed. Flow of mucus from the mouth, cough, and expectoration of thick ropy mucus. Eyes covered with a purulent secretion from the conjunctiva which dimmed the cornea; when washed off it was speedily renewed. Rapid emaciation. Great weakness, especially of hind legs, and finally loss of power of them. Death, at times with convulsions, but generally none. A dry exanthematous eruption on the back, with falling off of the hair in several spots.

Morbid Appearances.

Mouth and Œsophagus.—In Cases 16, 18, and 29, all poisoned by internal exhibition of the salt, the mouth was in one (16) found studded with ulcerations, and there were small, dry, excavated ulcerations on the tongue. The œsophagus in its upper two thirds was externally of a dark red colour and thickened; in the corresponding internal portion the mucous membrane was entirely destroyed by ulceration, and could easily be scraped off with the handle of the scalpel; it had a greenish gray colour. The lower third was studded with small scattered oblong elevated ulcers. In No. 18 the œsophagus, internally near the pharynx,

contained several irregular fleshy-looking ulcerations. (See Plate I, fig. 1.) In 29 the œsophagus was intensely reddened towards the lower end.

Stomach.—In almost all cases, however the substance was exhibited, this organ was specially acted on. There were red spots here and there, or (13) it was slightly inflamed, and had at the bottom several patches of blood extravasated between its coats with similar patches in the duodenum. In 15 the cardiac half was healthy, but the pyloric half dark violet red coloured, though at the pyloric orifice and for an inch before it there was no trace of inflammation. The cardiac orifice was, on the other hand, found several times partaking of the inflammation of the neighbouring parts to a great degree. In 16, at the cardiac orifice and central portion of the stomach were extensive superficial ulcerations. Over the rest of the stomach were scattered deep irregular ulcers of a greenish colour, penetrating completely through the mucous membrane. The pyloric extremity was more healthy. The rugæ were here and there of a bright red colour. In Case 18 there was great constriction of the middle of the stomach, and the pyloric extremity was partly invaginated in the cardiac. The mucous membrane was very rugous and intensely injected. In the cardiac cul-de-sac were two violet-coloured, elevated, irregular patches, besides several abrasions or slight ulcerations, surrounded by highly inflamed mucous membrane. (See Plate I, fig. 2.) In 29 the mucous membrane yellowish red and easily stripped off.

Duodenum.—This portion of the intestinal tube was even more constantly acted on than the stomach. The injection began immediately beyond the pylorus, and varied from slight redness, or detached red spots and stripes, to intense inflammation and even ulceration. In Case 15 the same deep injection began immediately after the pylorus, and extended along the whole duodenum in equal intensity: in the jejunum it became gradually lighter, and ceased about the beginning of the ileum; the rest of the intestinal tube was healthy, except the rectum, which was deeply injected. In 16 the duodenum presented numerous vascular streaks, and scattered over it through its whole extent numerous oval ulcers. In 18 the mucous membrane of the duodenum was highly injected, plum coloured, and thickened, containing numerous very regular ulcers of an oval shape with sharply defined edges, the mucous membrane completely eaten out. The injection and ulcerations extended throughout the jejunum. The ulcers varied from a quarter of an inch to an inch in long diameter. (See Plate I, fig. 3.)

Ileum to Rectum.—Throughout the small intestines (Case 16) were numerous injected patches. There was a recent intussusception of the ileum in 16 and 18. In 18, 23, and several others, the colour and injection gradually died away, and were entirely absent in the colon and rectum. In 23 and 24 the mucous membrane of the cæcal valve was reddened, and had blackish spots on it. In 22 the colon and rectum were deeply reddened; and in 16 there were longitudinal bright red patches in the rectum, apparently the result of inflammation, and several spots of extravasated blood. In Case 22 the *mesentery* is reported to be injected. Contents—In general neither food nor fæces were found in

the stomach and intestinal canal; but they were lined with a tough reddish mucus.

Liver.—In 29 and 39 dark brown, very friable, and full of blood. In most the gall bladder was full of bile. In 17 the surface presented the appearance of alternate very dark and pale patches. The section had a mottled appearance. (See Plate II, fig. 6.) Yellow patches like those after phosphorus poisoning, and there the microscope showed fatty granulations in the hepatic cells. Scattered over both surfaces were numerous spots of a whitish-yellow colour about the size of a pea, slighly depressed, and of a softer consistence than the surrounding structure. When cut into they were found to extend into the substance of the gland in a globular form. In 18 both surfaces of the liver were studded with yellowish spots of a spherical shape, the size of large peas, reaching from one quarter to half an inch into the substance of the gland. Where they touch the surface there is a slight depression or indentation showing a loss of substance. They are of a softer consistence than the surrounding parenchyma. (See Plate II, fig. 5.)

Kidneys.—In Case 18 the tubuli were much injected, and the whole substance of these organs in a state of congestion. In Schindler's fatal case in the human subject, the kidneys were found enlarged, and when cut into, deep marbled red and filled with frothy blood. In Case 33 the bladder and its immediate neighbourhood were reddened.

Nose and Eyes.—In Case 13 the nose was full of purulent-looking mucus, which, however, did not reach into the sinuses; the conjunctiva was inflamed and covered with the same purulent-looking mucus.

Respiratory Organs.—In Case 13 in the upper part of the larynx, between the ligaments of the glottis, were found blood-stained coagulated masses, which could be separated from the walls of the windpipe like a membrane. In the bronchi were also found similar polypus-looking masses of mucus tinged with blood, which could be traced like cords through all the branches of the air-tubes. These masses when put in water were softened, and coloured it red, at the same time being partly blanched, but did not swell up in vinegar or ammonia; they were, therefore, not fibrine, but mucus coloured with the red matter of the blood.

In 16 the epiglottis and rima glottidis were congested and covered with thick ropy mucus. The internal surface of the larynx was highly injected and covered with muco-purulent matter. The trachea throughout its whole extent was very much injected, and lined with a dirty whitish coating like a false membrane, which could be easily detached with the back of the scalpel. This false membrane did not reach below the bifurcation, although the redness extended into the ramifications of the bronchia as far as they could be traced. The lungs were apparently healthy, except that the dependent portions were congested with blood; they floated with the heart, however, in water. In 17 the same thick purulent mucus lined the larynx and trachea, but there was no false membrane or injection. In 18 the larynx and trachea vascular, and in the trachea there were irregular longitudinal streaks and patches deeply injected (see Plate I, fig. 4) covered with viscid mucus similar to that reported to have been vomited. The injection continued to where the bronchia began to divide in the parenchyma; but the

lungs themselves were not in the least injected; on the contrary, they were pale and bloodless. In 22 the larynx and trachea contained about a tablespoonful of healthy-looking pus. There was pus also in the bronchial tubes.

In 17 the lungs were mottled but quite crepitant: there was a yellowish spot of about an inch in length on the surface of the inferior lobe of one of the lungs.

Heart.—The heart was generally distended with blood in both cavities. In 16 the pericardium was slightly injected, but there was no effusion.

Brain and Spinal Marrow were generally normal; but in one or two experiments they are said to be more full of blood than usual, and of a softer consistence.

General appearance.—Greatly emaciated. The irritability of the muscles, especially of the heart, diminished. The muscles were reddened as after poisoning with carbonic oxyde.

Appearance of the Wound.—The application of the salt to the raw surface always gave great pain; but in Case No. 13, the wound was found pure and scarcely any pus secreted: in Nos. 15 and 33*a* the salt was entirely absorbed and the wound not inflamed: in Nos. 33 and 39 the wound was very painful to the touch, and secreted much lymph; yet it was after death quite dry and not reddened.

Morbid appearances in experiments which lasted from 4 to 10 weeks. The five subjects of these experiments were all rabbits.

Experiment 24.—A rabbit got 1 grain of 1st trituration of Kali Bichromicum ($\frac{1}{100}$th grain) for 22 days, then 2 grains of the same till its death in 6 days more.

No. 25 received the salt in the same way, and died in 40 days.

No. 26 was treated in the same manner, but as it was not much affected the quantity was gradually increased till on the 60th day 5 grains of the 1st trituration ($\frac{1}{20}$th grain) were given. On the 62nd the daily quantity was increased to 6 grains. On the 67th day 8 grains. On the 69th day 12 grains. On the 71st and 72nd days the medicament was omitted. On the 73rd and 74th again 12 grains. On the 78th day it died.

No. 27 was treated in the same way with gradually increased doses, and it died on the 74th day.

No. 28 also in the same way. For the last six days it received 20 grains of 1st trituration daily ($\frac{1}{5}$th grain of the pure salt).

Under this treatment the animals exhibited the following symptoms. In about two weeks a thin watery discharge from the nose came on and gradually increased in quantity and consistency, till the nostrils were partially obstructed and the hair beside them matted together. Soon after the commencement of the discharge from the nose the fur of their coat began to stick out and lose its smoothness, then layers of white scales formed on the skin at different parts, and gradually spread over the whole surface; but were thicker at the neck, back and thighs. They lost flesh rapidly, even to emaciation, before the appetite and excretions were perceptibly affected. Then they got dull and weak, and trembled in moving about, refused food and drink, and finally died.

Skin.—The coat was rough and staring, and the fur sticking up. It was everywhere covered with patches of scurfy whitish scales. Inside the parts of the skin corresponding to the scurfy patches were thickened, and the corium of cartilaginous consistence: when cut into were white and shining like fibro-cartilage. In case 27 the skin internally seemed to the feel thickened, and interspersed with gritty particles between the lamellæ of the skin.

The muscles of the body were thin and wasted, and the whole body emaciated to a remarkable degree, so that the vertebral spines stuck out conspicuously.

Stomach.—The stomach was generally found full of the remains of food. The mucous membrane in No. 25, at the bottom and towards the pylorus, easily stripped off from the muscular coat, and easily rubbed to a pulp in the fingers. In Nos. 26 and 27, on the whole inner surface, especially at the cardiac orifice, it was thickened and raised in scales easily stripped off while the outer surface of the viscus was red.

Small Intestines.—The ileum (24) in its inner surface was pretty strongly reddened, with great injection of the vessels, and the whole tract of the small intestines contained a viscid gelatinous mucus. In 26 and 27 the gut was outwardly reddened and injected, and the tissue easily torn; but internally no trace of inflammation, and the contents the same viscid mucus.

Large Intestines.—At the point of junction with the small intestines (24) there was considerable vascular injection, and the coats of the gut had lost their transparency. In 26 the coats of the large intestine were easily torn. In 28 throughout the whole course of the colon, between the muscular and peritonæal coat, there was an abundant collection of a briny, coagulated (sulzartig geronnenen) transparent, gelatinous mass. In 25 the rectum was constricted at three places, and distended with gas between these constricted places. The contents were pitchy, or green or clayey fæces.

Mesentery and Glands.—In 24 and 25 the vessels of the mesentery and meso-colon were filled with blood. In 26, 27, and 28, besides the injection of the mesenteric vessels, the glands of the mesentery were in some spots thickened, enlarged to the size of peas, and containing a bluish brown or brown friable substance. In the three last cases the diaphragm was reddened and traversed by enlarged vessels.

Liver.—The liver was in every case enlarged, and in some even to twice its natural size; it was in all cases full of blood and friable, and easily rubbed to a pulp between the fingers. Its colour was dark reddish brown, or even blackish in Nos. 24 and 25. It was double its natural size, but the colour lighter than natural in No. 26. The gall bladder was full of bile in all cases.

Kidneys and Bladder.—In No. 24 the tubular substance was somewhat softer than natural, and reddened: the bladder was full of clear watery urine. In No. 25 the kidneys were dense and firm: the vertical and tubular parts not to be distinguished by their colour, which was in both dark brownish-red: the bladder was quite filled with thickish yellow purulent-looking urine; its coats soft but without any traces of inflammation. In No. 26 the kidneys were outwardly dark

coloured, and inwardly showed only slight traces of the tubular substance. In 27, when cut into, they showed a brownish-red colour, so that no trace of the tubular substance was to be seen. No. 28 presented exactly the same appearances. In the three last cases the bladder was quite empty.

Nasal Passages.—In No. 28 nasal passages were reddened. In 25 they contained a considerable quantity of cheesy white soft masses : the mucous membrane was softened and discoloured, showing several spots like small ulcers ; but it could not be distinctly made out whether they were ulcers or softened spots.

Lungs.—In Nos. 24, 25, and 27 the lungs were collapsed so much as in 24 only to fill the posterior cavity of the chest : their colour, both on the surface and in the parenchyma was deep pink or cinnabar colour ; they were unaltered in tissue, crepitating and swimming in water. In No. 26 the front extremity (dependent part) of both lungs showed marks of inflammation, and sank somewhat under the surface in water.

Heart.—In all cases the auricles and ventricles were filled with dark clotted blood. In 26 the heart was enlarged to nearly the size of a whole lung. In 27 the heart seemed larger than both lungs put together : the pericardium was reddened, and the coronary arteries full of blood.

Brain and its Membranes.—In No. 27 the meningeal vessels and the sinuses were gorged with blood : the surface of the left hemisphere very vascular. In 26 the membranes were reddened, and posteriorly there was an extravasation of dark blood on the surface of the brain. In 25 the membranes somewhat reddened, and there was considerable vascular development in the ventricles : the brain was very soft. In 24 vascular development in the membranes, which were uniformly reddened : the vessels of the cerebellum and medulla oblongata as if injected : the substance of the brain was very soft, and falling into pulp under the pressure of the finger.

Register.

Here follow the pathogenetic symptoms of the drug, arranged in groups as they occurred in the provings and poisonings, under the Hahnemannic order of the regions to which their idiopathic action seems mainly to belong. At the same time an index is attached to each region so that every individual symptom can be readily found whether idiopathically or sympathetically related to that region. A pathological and therapeutic commentary is also given under each region.*

* As the therapeutic action of K. bich. was completely unknown through popular or empirical use, this proving may be taken as a test of the truth of the Homœopathic principle as the means of discovery of the specific curative action of drugs in the form of prediction afterwards verified by experience, as is the case with all true scientific principles. In the pathogenesy published by me in 1844, and by the Austrian Society in 1847, are contained substantial anticipations of the results of therapeutic experience as shown in my second edition in 1852, and in the present work. Contrast this with the statement of a recent authority of deservedly high reputation in experimental physiology who has given some attention to this drug, viz. Vulpian, who says "The knowledge of the toxic effects of bich. potass. furnishes us,

SYMPTOMS AND THERAPEUTIC USE.

MIND.

Idiopathic action on the mental faculties does not seem to lie within the sphere of the action of K. bich. The symptoms given in the subjoined index are evidently subordinate and sympathetic in the groups to which they belong. Nevertheless we may expect it to be an important remedy in certain forms of hypochondria and hysteria, and even mental disorders, which are often dependent on reflex action from the organs specially affected by this drug.

Index.

Anxiety and depression of spirits, 107, 114 (colic and gastr.)
Anxiety, 109 (gastr.)
Disinclination for mental exertion, 137^{28}, 80*a*.
Ill-temper and disinclination for mental or bodily work (many provers).
Indifference and depression of spirits, 80*a*, 249 (general languor).
Ill-humour, 132^{11} (abd.) 80*a*, 105*a*.
Irritability, 130, 119, 137^{28}, 93.
Melancholy, ill humour and *tedium vitæ* (several provers).
Much disturbed by a slight vexation, 120.

on the whole, with no data which can serve to guide us in therapeutic trials." After noticing that it seems to provoke first excitement and then depression of the nervous centres, and irritation of the extremities of the nerve fibres of the mucous membrane of the stomach and intestines, he says that does not give any reason to suppose that it can be useful in affections of the nervous or digestive systems; for many drugs which provoke vomiting and purging when injected subcutaneously, exert no favourable influence in disease of the alimentary canal; and many which cause convulsions and loss of nervous power are of no use in diseases of the nervous centres. Then he goes on, "It is not the inductions founded upon experimentation which have led me to make therapeutic trials with bichromate of potash. I was led to it in as far as concerns the medullary affections when trying to find medicines which could be recommended to patients with *tabes dorsalis* or other sclerotic myelopathies, when nitrate of silver, phosphorus or iodide of potash have remained powerless. And as to the maladies of the stomach, I was induced to try the bichromate in some of them, while seeking to know whether this salt might not act like the arseniates or arsenites in analogous cases." Such are the reasons given by this blind leader of the blind for experimenting on patients with this powerful poison! He ignores entirely the published experience by myself and the Austrian Society with this medicine, and also the fact that the use of arsenic in gastric disorders similar to those produced by its toxic exhibition was first made known by the Homœopathic School, and that it falsifies the dictum on which he acts above. Vulpian deserves, no doubt, his high reputation as an experimental physiologist, but when he attempts experimental pharmacology while ignoring the Homœopathic principle in deference to vulgar prejudice, he virtually interrogates nature with the preconceived resolution not to receive her answer if it tends in one particular direction— a position quite incompatible with that of the true man of science.

The consequence is that we have here to enrol his results as empirical confirmations of the principle which he ignores.

Head and Sensorium.

1. Inclination to vomit for an hour, and in the evening frequent threatenings of giddiness. Next day, frequent sudden attacks of vertigo on standing or walking, so violent that he staggered and thought he would have fallen (*Mfr.*, 3 *provings, l. d.*).
2. Soon after the dose, nausea, giddiness, and drawing pains in the hands, feet, and back (*Mr.*, 1 *dose l. d.*).
3. Paroxysms of vertigo every two hours, lasting for twelve hours, succeeded by headache chiefly in the frontal protuberance, with extreme prostration of strength (*A female, aged* 36, *after* 30 *gtts.* 1*st. dil*).
4. Giddiness at 10 or 11 o'clock, a.m., increased on stooping. Stabbing pains in the left hypochondrium (*Ch. W.*).
5. Giddiness in the morning, relieved by tea. Lightness across the forehead on stooping, chiefly in the morning. On stooping, frontal headache as after a debauch. Musty taste in the morning. Bad appetite and foul tongue. Sour vomiting, excited by stooping or moving, with pain at epigastrium (*Atgn. Ch. W.*).

5*a*. Maziness, dizziness, and inclination to sleep.

6. Vertigo on rising from his seat, everything appeared turning round, accompanied by pain in epigastrium; pain across the loins, he cannot straighten himself after stooping (*Bru. Ch. W.*).

6*a*. Vertigo by suddenly throwing back the head with nausea (*Mr.*, 1*st dil.*).

7. On the fourth day a severe headache came on in the afternoon and increased gradually till dinner, after which (eaten with appetite) it was relieved, though not gone. Next morning it was gone, and he had a copious loose stool (*Dle.*, 2*nd dil, night and morning for six days*).
8. Violent shooting pains from the root of the nose along the left orbital arch to the external angle of the eye exactly, with dimness of sight like a scale on the eye, begins in the morning and increases till noon, goes away towards the evening. Lasted three weeks (*Bws.*, 1*st. dil. bis die*).
9. Soon after rising in the morning a darting pain in a small spot over the left eye, spreading over the forehead, but still remaining worst at the original spot; worse on motion. After breakfast, aching pain beginning at the navel and rising up the throat, lasting half an hour (*A female, aged* 14, 1*st dil. bis die*).

9*a*. Pressing headache with stitches in left ear and parotid gland (*Mr.*).

10. Soon after dinner a dull heavy throbbing pain in the forehead, feeling as if it would burst, above the eyes extending into the head, with desire to lie down, and relieved by lying down or resting the head on anything, and by being in the open air; worse on stooping or moving about.

10*a*. Violent semilateral headache in left of forehead. Pressing together of head from both temples. Nervous pains in different parts of head especially temples. Frontal headache with pressure on eyes.—(*Zl.*).

11. Dryness of the nose, with sensation of pressure at the root of the nose as at the beginning of a stuffing cold in the head, with cold sweat on forehead. The pressing pain spread to the temples and confused the whole head; later in the day very violent headache with weariness of the limbs; vertigo, nausea, and inclination to vomit, with retching up of sour watery fluid; shambling of the legs; he must sit down. Drawing pain in right hip stretching to the knee; aching in the lowest ribs in the right side, lasting two days (*Reisinger*, ½*gr.* 1 *dose*).

11*a*. Headache of extreme violence, pressing and beating in whole head, and stabbing in a circumscribed spot near vertex; touching the hair at that spot is very painful, with nausea and chills. Also pressive pains in the heart accompanied with transient palpitation and oppression. On the same day pains in the right shin, dorsum of foot, ankle, thumb, fingers, and back of right head; aching in left hip-joint, arm, and shoulder. Transient stitches in the left molar teeth, ear, and side of neck (*Mz.* 20 *gr.* 1*st trit. second day*).

12. On the third day, both while sitting and walking about, he had distinct pain in the bone at the middle of the left tibia; it came suddenly, lasted for a few seconds, and then went off suddenly, and returned thus frequently; also for a few minutes a similar pain along the left orbital ridge of the frontal bone. Next morning, 10 a.m., this latter pain came again, and gradually increased and spread to the upper left maxilla, and was attended with flow of saliva; then it went off imperceptibly. It returned for three subsequent days at the same hour (*Schlesinger*, $\frac{6}{10}$ *to* $\frac{8}{10}$ *gr.* 4 *doses in seven days*).

12*a*. Tenderness of the bones of the head (*Zl.*).

13. On the second day he had again the pain in the forehead for about two hours in the morning; next day three hours. It returned daily for ten or twelve days in all; six or seven days after the medicine was stopped. It became daily milder and of shorter duration, and came later in the day. For the last five or six days there came also a paroxysm in the evening, which followed the same course (*Schl.*, $\frac{8}{10}$ *gr.* 3 *doses in five days*).

13*a*. He was seized with violent pain in the left parietal region above and behind the temple in a spot the size of a crown-piece. The pain was felt chiefly at night and subsided during the day, and came on violent again at the same hour in the evening about sunset. A swelling soon formed at the seat of the pain, it grew more in the night, and went down a little in the day; in a week it got to its height, and was then about the size of an egg. It was then quite hard and not sore to the touch. The pain was confined to the lump, and was of a stabbing character, and as if the head were opening. It lasted in all about two months, and then the pains and swelling gradually went away without any suppuration or softening (1 *Ch. W.*, *aged* 16). [It was carefully ascertained that this lad never had syphilis nor mercury.]

13*b*. Creeping in the temporal bone. Tension in temporal muscles (*Zl.*)

13*c*. Some pain in scalp at vertex and standing up of hair (*Mz.*).

Pathological anatomy.

In the experiments on animals, the brain and spinal marrow are reported full of blood and soft in the first class, being those with rapid death (within twelve hours). In the less acute and in the chronic cases, there was reddening and injection of the membranes of brain, and fulness of the sinuses. Injection and redness on surface of brain, cerebellum, and medulla oblongata; an extravasation of bluish-black blood on surface of brain, posteriorly in Case 26. Substance of brain reported soft in many cases. No 26 was a case of death in seventy-three days, with congestion of lungs and kidneys and enlargement of heart.

Analysis and index to head and sensorium (local symptoms 1 to 13c).

(The Symptoms throughout are arranged in the order of the Cypher Repertory. The small figures attached to a number indicate the line in the paragraph.)

Vertigo, lightness, dizziness, &c., 1, 2, 3, 4, 5, 84, 92[2], 94 (im. eff.), 99 (gastr.), 152 (cough), 163 (renal).
— as if everything turned, 6, 132[13].
— in paroxyms, 3.
— in forehead, 5.
Confusion, maziness 99 (gastr.), 135[19].
— in the morning, 107.
— in the temples, 109[19].
Insensibility, 96[6] (toxic).

Conditions.

Morning, 5.
Forenoon, 4.
Evening, 1.
Open air, better, 109[13].
Standing, 1.
Sitting up in bed, 132[15].
Rising from a seat, 6.
Moving head, 129[12].
Motion, 5.
Throwing back head, 6*a*.
By lying back, 132[16].
Stooping, 4, 5, 106.
Walking, 1.
Walking better, 106.
Better by tea, 5.
After cough, 160[11].

Concomitants of Vertigo.

Nausea 2, 6*a*, 11, 84, 132[16].
— sour retching, 11.
Staggering, 1.
Headache, 3, 164.
Pain in epig. 6.
— in hands, feet and back, 2.
Heat all over, 84.
Sleepiness, 5*a*.
Weakness, 3.

Succession of Symptoms.

Vertigo, followed by headache, 3.
— — vomiting, 92[4].
— — weakness of legs, 11.
— preceeded by nausea, 1.
— and headache, then lumbar pain, 164.

Head.

Fulness, 121.
Heaviness, 160[12], 65, evening.
Humming, 127[9].
Creeping contraction on scalp, with nausea, 111[14].
Scalp, soreness on, 13*a*.
— itching eruption, 205.
Hair falls out. See concluding remarks.
— on end, 13*e*.
Hard swelling on head, 13*a*.
Feeling as if bones would fly asunder, 136[24].
Burning of skin of head and face, 127[18].
— forehead and thighs, 205.
Flushes up to head, 86 (im. eff.)
Pains—
paroxysmal, 201, 204[5].
small spot, 112, 123, 9, 11*a*.
periodic, 12, 13, 13*a*.
flying, 135[3].
pressive, 10*a*, 137[5], 128, 136[20], 164.
cutting like a knife through whole head, 137[3].
shooting and darting, 129[11], 137[7], 204[5].
as if needles thrust into bones, 204[6].
throbbing, 11*a*, 120, 121, 123, 129[13].
tearing, 137[5], 201.
bursting, 136[24].

Conditions of Pains.

Night, 13*a*.
Morning, 8, 9.
Forenoon, 201,
Afternoon, 130.
Evening, 65.
— better, 8.
Open air, 129[9].
— — better, 10.
By touching hair, 11*a*.
Lying down better, 10, 129[18].
Stooping, 5, 10.
Bending forwards, 121.
Motion, 9, 10.

Better by rest, 129[14].
By walking, 129[14].
After dinner, 128, 10, 135[12].
Better after eating, 7.
On awaking, 136[20], 201.

Concomitants.

Pressure on eyes, 10*a*.
Dim sight, 8, 123.
Lachrymation, 137[12].
Salivation, 12.
Burning in pharynx, 129[10].
Stitches in ear and parotids, 9*a*.
Increased appetite and thirst, 121.
Nausea, 11*a*, 129[10].
Colic, 120.
Pain at right nipple, 128.
Palpitation, 11*a*.
Quick pulse, 137[9].
Chills, 11*a*.
Cold sweat, 109, 120, 11*a*.
Weariness, 11.

Succession of Symptoms.

Pain extending to up. maxilla, 12.
— in tibia and then in forehead, 12.
Headache followed by languor, 136[21].
— — pain in shoulder, 204[8].
Headache after stoppage of nasal discharge, 53.

Locality.

Frontal, 3, 10, 10*a*, 129[8], 89, 92[8], 104, 109, 120, 128.
Forehead and occiput, 201, 137[6].
Supra-orbital, 8, 9, 12.
Root of nose, 11.
Temples, shooting, 94, 98, 102, 129[11], 135[2], 137[7], 193[4].
— pressing together from, 10*a*.
— throbbing, 123.
Temporal bone-creeping, 13*b*.
— muscle-pain, 201, fascia, 204[3].
Crown, 13*c* 11*a*, 136[20], 164.
— spreading to temple, 130.
— throbbing, 120.
— followed by pain in shoulder, 204[8].
Parietal bone, 129[12], 202.
Occiput, 104.
— to forehead, 53 (Nose).
— and forehead, 201.
— and left arm, right side of, 204[23].
Semilateral pains, 10*a*, 112, 135[3], 129[13], 203, 204[4].
Whole r. side, 203, 204[1].
— l. forehead, 10*a*.
Periosteum, 13*a*,
Bones, 129[13], 202, 204[5].
— tenderness, 12*a*.

Commentary.

Although congestion is present in many of the varieties of headache and giddiness, yet these are generally rather sympathetic of disturbance of the abdominal organs than idiopathic. We may, therefore, expect to find it curative in the so-called gastric and bilious varieties of congestive headache. On the other hand, the pains depending on affections of the fibrous tissues, periosteum, and bones, and also the peripheral expansions of the sensiferous nerves are idiopathic, and indicate its value in rheumatic, neuralgic, and periosteal affections, and probably also certain forms of migraine and clavus hystericus. The supra-orbital neuralgia indicated in Symp. 8, 9, and 12 is well marked; an actual rheumatic node is described at 13*a* and these will be found confirmed in the therapeutic chapter. The idiopathic head symptoms correspond most nearly with those of arsenic, staphisagria, phosphorus, thuja, and chelidonium.

Therapeutic Experience.

It has been found useful in a variety of painful affections in the head and also giddiness in various forms. For the most part these were subordinate or secondary to gastric and hepatic disturbances. I find in my note-books a case of vertigo and staggering with confusion of sight, connected with gastric distubances and vomiting, in which it effected cure. When the pains were more independent, they were of a neuralgic or rheumatic character as is shown in the following individual cases:

Case 1.—Pain in the temples. R. D., aged 24. A month ago he was suddenly

seized with violent pain in both temples, which has continued since; it is a shooting outwards, in the temples and over the eyes, continuing day and night, but less severe during the night; it is worse on stooping, which also brings on vertigo; no coryza; otherwise healthy. K. bich. 6 was given, three times a day. Three weeks after he came to report that he had got well while taking the medicine, and had had no return of the pain.

CASE 2.—E. M., a woman, aged 46, had had for a month a violent pain in left side of the head, at the zygomatic process; worse when lying on it; shooting inwards and towards the throat; the throat was a little reddened, but not swelled; she had also some gastric symptoms. K. bich. 3, ter. die relieved it in a few days after merc. and ars. had failed.

CASE 3.—A woman, aged 38, had complained for six months of pain in the left side of the head and over the left eye; worse at night; she had also pain in right side of the chest, from the scapula round to the anterior part; also gnawing at epigastrium after meals; catamenia scanty and some leucorrhœa. K. bich. 6, bis die, then the 3rd and 12th dil. alternately every 6 hours removed the symptoms in about 3 weeks.

The supraorbital neuralgias indicated in S. 8, 9 and 13 have been remarkably confirmed in therapeutic experience, and K. bic. is now the medicine which is to be first thought of in such cases. Subjoined are some cases.

CASE 4.—M. M., a female, aged 44, had suffered for a fortnight on the 4th Dec., from pain in the forehead; it begins at 9 o'clock, a.m., in the left temple, and stretches across the forehead to the right temple, and round the eye and the malar bone of the right side; attended with complete loss of sight in the right eye during the pain, and puffy swelling on the malar bone; the paroxysm goes off in the afternoon; she was otherwise well. K. bich. 12 bis die. Next day the pain began later, but was more violent, and the attacks gradually declined, though irregularly, till, on the 10th, she had no pain; on the 12th she had another attack on the opposite side of the face, which lasted twelve hours, and after that she had no return of it at all

CASE 5.—H. F., a man, aged 32, had been for some time affected with neuralgia. The pain begins at the right supraorbital ridge and spreads over one side of the head; it comes on early in the day and lasts ten hours, leaving soreness of the scalp; he is otherwise healthy. K. bich. 12 ter die. In a week he came to say that he began to improve immediately, and there remained none of the violent pains, but still a slight pain of the same character. K. b. 6 bis die. In another week he was quite well.

CASE *5a.*—A young man had, for a year, been subject every two or three days to the following: He is seized with dimness of sight, then numbness as if asleep of right arm; then in about half an hour it gets better and the lips become numb and stiff, and insensible; this lasts about the same time then comes on violent pain along one (sometimes the same, and at others the opposite) supraorbital ridge; a heavy aching with dimness of sight, which lasts the whole day, and next morning he is quite well. K. bich. bis die in different dilutions, from 18 to 3, speedily lessened the frequency of the attacks, and eradicated them in three months.

CASES *5b.*—Two cases of neuralgia are reported by Dr. Haines, of Ellsworth, Maine. In both the pain came about 9 a.m., increased till noon, then declined and went off in the afternoon. The pain was in a small spot over the inner angle of right eye and might be covered with the tip of the finger. After K. bich. in the 1st trit., complete and permanent cessation of the pain. (*Hahn. Monthly*, January, 1882.)

EYES.

14. Burning of the eyelids.

15. Smarting and biting of the eye.

16. On awaking on the second day, burning in the inner canthus, which extended over the whole lower lid, aggravated by writing (*Lack., 1st trit. daily for nine days*).

17. Smarting in the eyes, worse in the open air on the first day; on the second and fifth pressive pain in the ball and burning; on the fourth soreness in the right caruncula (*Dgn.*, *l. d.*).

17 *a*. Burning and pressure and lachrymation in the open air (*Ze.*).

18. Burning in the eyelids, increasing in intensity daily, and on the sixth they were glued up on waking (*Zl.*, *1st trit. daily l. d.*).

19. On the fifth day smarting of the external canthus; on the eleventh redness of the conjunctiva, with heat and an uneasy sensation as if when opened under water (*Dle.*, *1st dil. fourteen days*).

20. On the second day watering, itching, and burning of the eyes, especially the upper eyelids. The *conj. oculi* is reddened and traversed by large red vessels, and he had the sensation of something fallen into the left eye (*Mz.* ½ *gr.* 1 *dose*).

21. After burning in the eyes frequently, on the nineteenth day there was some œdematous swelling of both eyelids, which lasted till night (*Lack.*, *1st. trit.* 1 *dose daily*).

22. On the first day itching of the canthi, dryness of the eyelids, slight redness of the conjunctiva and troubled vision. Next day itching and watering of the eyes, the albuginea is dirty yellow and appears puffy, with yellowish-brown points the size of pin-heads; heat in the eyes and desire to rub them. On the third day troubled vision, this was worse on the fourth day, and on looking at an object the eyes burn and the sight goes away, the objects appearing without distinct outline. These symptoms went off gradually in three days more (*Mr.*, *l. d.* 1 *dose*).

22 *a*. Flickering and seeing of muscæ, colour, and sparks, so that he could scarcely write (*Zl.*). Doubtful symptom.

23. After smarting, itching and watering frequently during the day, and morning agglutination during the previous days. On the seventh the eyes were glued in the morning; the itching and watering continued all day. In the afternoon the photophobia increased to such a degree that he could not open the eyes or bear the light of day without constant quivering and twitching of the eyelids, and great watering of the eyes and burning of the lids. Towards evening the photophobia went quite off, and he could bear artificial light; the tarsi were much reddened, and the *conj. palpebrarum* injected and red. The eye symptoms went off gradually in the next two or three days (*Mz.*, 9 *gr. 1st trit. daily for ten days*).

23 *a*. Jerking and twitching of eyelids on and after reading (*L.*).

24. After frequent burning in the eyes, especially in the outer canthus, during the previous days, on the twenty-first day at noon in the house he had pressure and burning in the eyes, and feeling as if sharp sand in them. In the albuginea of the right eye, not far from the cornea on the outer side, he saw a brown spot of the size of a pin's head. Towards evening again great burning and the feeling of increased heat in the right eye, and also at times in the skin round it. For the next few days the eyes were agglutinated, and sensitive to touch and motion, and heavy (*Zlat.*, *2nd trit.* 1 *dose daily for twenty-seven days*).

25. On the eighth day several bright red spots and streaks appeared on

the white of the eye; in progress of time they changed their place, and in thirteen days disappeared (*Zth.*, *l. d.* 1 *dose daily for four days*).

26. After burning of the eyes and agglutination of the lids, and accumulation of yellow matter at the angles repeatedly on the previous days, on the eleventh and again on the thirtieth days the tarsi were reddened and itch, and burn, and seem rough, causing the sensation of friction on the eyeball on moving the lids; shooting pains in the eye. The burning and slight eye symptoms continued to return for about four weeks after the last dose (*Zl.*, *two provings*, *2nd trit.* 1 *d. daily for twenty-three days*, *and* $\frac{1}{10}$ *gr. every four days for eight weeks*).

26 *b*. In the forenoon pressure and burning at anus; afternoon burning of the eyes, and the lids feel thickened and rough on their inner surface (*Zl*).

Among the Workmen.

27. Redness of conjunctiva with lachrymation.

28. Heaviness and soreness of the eyes.

29. Pains in the eyes for the first fortnight (*McG.*).

30. Eyes inflamed, and adherence of the lids in the morning, and yellow discharge (*Hwe.*).

31. Eyelids inflamed and much swollen, and eruption broke out on them and adjacent parts of the face, lasting two days (1 *Ch. W. the day after exposure to the vapour of chrome liquor*).

32. Eyelids inflamed and much swollen (*Ghm.*).

33. Eyes tender, *conj. oculi* injected, eyelids slightly granular (*Plt.*).

34. Pustule on the left cornea, with surrounding indolent inflammation, attended with pricking pain; leucoma on left cornea (*Lge.*).

35. When any of the solution accidently gets into the eyes it produces violent inflammation and loss of vision.

36. Heat in the eyes, lachrymation in the morning at home, appearance of small white pustules in the conjunctiva of left eye towards the inner canthus. These "pustules" are small white granular elevations surrounded with a good deal of redness (*a young man nine days at the works*).

37. In the second week of exposure he had itching and pain in the eyes like sand in them, worse in the evening and night; the conjunctiva both of the bulb and lids injected (1 *Ch. W.*).

38. Redness and swelling of the upper eyelids, and next day pustules appear upon the hands. (*These are experienced by an individual very sensitive to the action of chrome if he merely passes through the works during the boiling.*)

39. Ophthalmia; it commenced with itching for several days, followed by pain and heat in the eyes and agglutination of the lids; the conjunctiva was red (1 *Ch. W.*).

39 *a*. The tarsal edges rounded, irregular, and destitute of eyelashes (*Del. and Hil.*).

Pathological Anatomy.

In animals the conjunctiva was inflamed, and covered with muco-purulent matter.

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The idiopathic action on the eyes is plainly shown in the foregoing, and its character well expressed. The anatomical nature of the changes seems to be inflammation of the conjunctiva oculi and palpebrarum, also of the caruncula lachrymalis, and probably also of the conjunctiva of the cornea accompanied with a blennorrhagic process. The tarsal edges of the lids are implicated, and probably the Meibomian follicles. The inflammation most closely resembles that of the catarrho-strumous character, as indicated by the phlyctenulæ towards the inner canthus, the photophobia ameliorated towards evening (S. 23), and the lachrymation. The inflammation tends to assume a subacute or chronic character, and commencing symptoms of granular conjunctiva and thickening of the lids are present. The deeper tissues are also not unaffected. The brown spots on the conjunctiva are peculiar, and probably the granular elevations of S. 36. Ss. 26 and 33 speak for its employment in some

stages of Egyptian ophthalmia. Accordingly it has been found curative in catarrhal and catarrho-scrofulous ophthalmia, in blennorrhœa, rheumatic inflammation, inflammation of the eyelids and tarsi, ulceration of the cornea, iritis, morbid growths on the cornea and conjunctiva; pannus. See p. 482. Graphites corresponds in respect to the photophobia in sympt. 23, and hydrastis, clematis, and sulphur in several general points.

Therapeutics.

The previsions in the commentary in the proving have been confirmed by therapeutic experience.

In simple catarrhal ophthalmia I have frequently found it the remedy, and Dr. Dudgeon testifies to the same, used both internally and and locally.

Case 6.—H. G., a boy, aged 6, who had been two days affected with inflammation of the eyes; the conjunctiva was reddened and injected and chemosed; much flow of tears; eyelids reddened and agglutinated with thick matter at the edges. K bich. 3 ter. die. In three days all redness gone, and no symptoms remaining except slight morning agglutination, which was also removed by the same treatment in a few days.

I have also had good results in ophthalmia tarsi, at times enjoining the external use as a collyrium of ¼ grain to the ounce of water.

In indolent and scrofulous ophthalmia I have also found it serviceable, as also Dr. Dudgeon.

Case 7.—*Scrofulous Ophthalmia and Ulceration of the Cornea.*—M. G., a girl, aged 13, had been for a month affected with inflammation of the eyes, which was little improved under several medicines. On the 28th April there was much injection of the conjunctiva, both of the bulb and the eyelids of both eyes; very red at the edges of the cornea, and a number of phlyctenulæ on the edge; several deep ulcers on the cornea; great photophobia and flow of tears; no pain. K. bich. 3 ter die, and K. bich. lotion of ¼ grain to the ounce of water, to be used twice a day. On the 1st of May there was improvement, but still the above symptoms, and the intolerance of light and flow of tears were very troublesome; K. bich. trit. 1, in water—a spoonful twice a day; lotion as before. On the 5th there was much greater improvement, and the symptoms were not troublesome. The medicine was then continued till the 19th, when there were no inflammatory symptoms remaining, and only a slight speck, for which euphrasia was given.

Case 8.—The case of M. M. was of a similar nature, but this patient, a girl of seven years of age, had been affected more than half her life with ophthalmia scrofulosa, and attended eye dispensaries continually. There were large ulcers on the cornea, and constantly recurring aggravation of inflammation on the slightest exposure. She was treated successfully with K. bich. internally and externally, in the 6th and 3rd dilution, with an interposition once of euphrasia, and once of natrum mur., and the remaining speck was treated with cannabis.

In another case of catarrho-strumous ophthalmia it was remarkably successful; the cornea was affected with a large opaque spot, to which large red vessels ran from the injected conjunctiva across the clear margin, and there was also a zone of fine injection of the bulb round the cornea; the usual subjective symptoms were also present. One grain of the 1st trit. was given, dissolved in fourteen spoonfuls of water, and one taken every four hours, and the solution of ¼ grain to 1 oz. used externally twice a day. Under this it was very much improved in a couple of days, and in a week all traces of inflammation were gone, and only a speck remained.

"It is of especial importance in chronic indolent forms of inflam-

mation of the eye, particularly of ulcers and pustules of the cornea in which no active inflammatory process is present, and therefore characterised by *no photophobia*, and no redness or very little, not so much as might be expected; the pains and lachrymation are also usually absent. Eye sensitive to touch. Opacities of the cornea have been benefited or even cleared up entirely" (Allen and Norton). They use it internally and topically at the same time.

A case, however, is given by Dr. Hawkes, of Liverpool, of strumous ulceration and nebulousness of the cornea, in which there was pain as if knives were being thrust through the eye, with conjunctival injection, photophobia, and profuse lachrymation. It was cured in three weeks with K.-bi. 3, 4tis horis. I have frequently had such cases, and therefore do not agree with Allen and Norton that absence of photophobia and redness are a necessary indication.

Pannus.—"A man, aged 27, had granular lids, complete pannus of right eye so that he could barely count fingers, and partial pannus of left eye; there was considerable discharge, and everything appeared slightly red to him; eyes seemed to feel better upon lying on his face. Under K-bi. the pannus entirely cleared, leaving a slight opacity behind, but he could see No. 3 of Snellen's types easily with the right eye" (Allen and Norton, *Ophthal. Therap.*).

It is also recommended for pannus and torpid ulcers by Klaube (*Allg. hom. Z.*, 96, 133), and for sarcoma on the conjunctiva by Payr (*Allg. h. Z.*, Bd. 78).

Chromic acid is recommended by Hairion as an escharotic in granular ophthalmia, in cases where previous treatment had left rugosities on the conjunctiva of the lids. Chromic acid applied in concentrated solution acting as a caustic reduced these rugosities and made a smooth cicatrix, which did not irritate the cornea.

In rheumatic sclero-iritis I have often found it curative.

CASE 9.—The iris was muddy and sluggish, and the cornea looked projecting; fine sclerotic injection round it, and some conjunctival injection. The sight very dim, like a gauze; lachrymation on exposure. The pain had never been a prominent symptom, and was only stiffness at the outer canthus, and a burning pain on the upper eyelid on touching it. K-bi. 1 8vis horis effected a cure.

In syphilitic iritis Dr. Kitchen reports it as curative in two cases. I give also the following:

CASE 9a.—*Rheumatic sclero-iritis in a syphilitic constitution.*—A man, aged 29, who had been salivated for syphilis four years before. Symptoms: great pain in head over right eye, with excessive lachrymation and intolerance of light; sclerotic was deeply injected; iris muddy; conjunctiva injected; a large white, opaque, spongy-looking speck in middle of cornea, to which red vessels ran across the clear part. Under sulphur, belladonna, and spigelia some relief of pains in head, but eye symptoms the same. He now got $\frac{1}{10}$th gr. of K-bi. every six hours, and in a fortnight the eye was free from inflammation (reported by me, *B. J. Hom.*, xv, p. 676).

Dr. Ussher reports a case of cure of syphilitic iritis in both eyes, with synechiæ and partial closure of the pupils, by K-bi. internally and no local application of any kind (*Hom. World.*, February, 1883).

I have found it useful in catarrhal blennorrhœa of the lachrymal sac and partial closure of the nasal duct.

Ears.

61. Singing or humming in the ears, which continued for three days incessantly (*Zoth., two provings, 1st trit. for three and five days*).

62. A swelling of slightly inflammatory character in the external meatus of the left ear, which disappeared in four days, without much pain (*Zth., 2nd trit. several days*).

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62*b*. When walking pain through external meatus extending into internal ear.

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Nose.

40. In the morning sneezing ten times in succession. First day (*Zl., 2nd trit. 8 days*).

41. At noon tickling and itching of the nose, and feeling of coldness in drawing air through it; dull soreness in the septum, smarting when touched; flow of watery fluid from both nostrils; troublesome quivering and creeping, as of ants, beginning at the right side of nose and spreading up to the eyelids, causing jerking of them: sneezing. These symptoms came back daily for two or three days (*Mz., 15 gr. 1st trit.*).

41*a*. Tickling compelling him to sneeze although he has no coryza (*R*).

42. The smell even of strong scents blunted on the third day, to the surprise of others, succeeded by frequent sneezing and incipient coryza. Two days afterwards the sense of smell became unusually acute. Loss of smell; and bad smell before nose, preceded by stuffing and increased secretion (3 *male provers, low dil. 1 dose daily*).

43. On the ninth day soreness and swelling of the right ala nasi (*low dil. 1 dose daily*).

44. In half an hour, sneezing with pressing sensation at the upper part of the larynx, which extended through the choanæ to the nose. It changes into a tickling in the larynx, and spreads through the mouth and ears; forcible sneezing; aching in the root of the nose (cribriform plate) with heat to the touch of the nose at that spot, and pulsation. The nose swells, and is red and stuffed, and she speaks through it, and feels as if there was a thick substance in it, making her blow it often, but nothing comes out—it is dry. The same continued next day, and on the third day she had constant attacks of convulsive sneezing with heaviness in the head, and in the afternoon

burning in the right nostril, and flow of bright red blood in drops. On the fourth day the same bleeding after dinner; tickling in the nose and throat after it stopped (*N.*, *3rd dil.*).

44*a*. Unpleasant sensation in my nose as if water had been drawn up violently; it grew gradually worse and lasted about forty-eight hours; on the third, fourth, and fifth days, I had to blow my nose more frequently than usual, about ten or twelve times a day, and discharged each time natural looking mucus considerably streaked with light-coloured blood (I never had nose bleed in my life); after this, for several days, a sensation in the middle of the left ala nasi as if there was a very dry spot, or as if it was denuded of mucous membrane (*Œhme from pulverising crude drug*).

45. On the first day, in the evening he had some pressive headache with burning in the eyes, and afterwards sensation as if the nose were stopped, with great heat of the expired air from the nostril. In two hours epistaxis came on. The epistaxis reappeared on the evening of the sixth day, and after dinner on the seventh, preceded by burning in the eyes (*Lach.*, *1st trit.* 5 *days daily*).

46. After several days of no symptoms he awoke in the night with bleeding of the right nostril, which stopped with difficulty (*Schl.*, *1st dil.* 1 *dose daily*).

46*a*. Frequent bleeding from right nostril; obstruction at times, then fluid secretion; smell blunted; fœtid smell (*A.*, *2nd dil.*).

47. On the second day, bleeding of the nose, and in the evening quite suddenly coryza, chiefly in the right nostril. Next day it was worse, and much fluid was secreted by the right nostril, and a spot in the right lachrymal bone is swelled and throbbing. On the fifth day, the right side of the nose was painful, and in blowing the nose he feels as if two loose bones rubbed against each other. This continued till the eighth, and there were greyish, at times fœtid, masses blown out, and slight ulcerated spots formed at the entrance of the nostrils, and healed up in the next two or three days (*Arn.*, ½ *grain* 1 *dose*).

47*a*. A scab in left nostril which bled at each attempt to remove it, and soon formed again and bled anew on touching, but without pain (*Mgr*).

48. On the first day a considerable mass of tough concocted mucus hawked up. After dinner several times he had a short dry cough. On the fourth day he awoke with considerable dryness of the nose; this symptom reappeared on the next day for a short time, accompanied with soreness; and again on several days towards the latter end of the proving accompanied with soreness and burning, and with intervening days of more or less mucous discharge; on one occasion a pain spread to the ear. The burning extends up into the frontal sinuses. On the twelfth day, in the evening (without smoking), there was a tickling like a hair moving in the top of the left nostril, lasting for a quarter of an hour and forcing him to bore his finger into it, although the nostril was empty and quite dry (*Zl.*, *2nd trit.* 27 *days*, 1 *dose daily*).

49. At the commencement of the proving there was a considerable flow of water from the nose, in spite of the heat of the weather, sub-

sequently becoming acrid, burning the upper lip and excoriating the nostril. On the tenth and twentieth days, dull aching at the root of the nose. On the thirteenth, the nose became dry and continued sometimes dry and sometimes watery until the end of the proving, the nose often being dry in the morning and watery towards evening. On the tenth day, after exercise, he had bleeding from the nose (quite unusual). On the twenty-fifth day he had a sensation as if he drew in sulphuretted hydrogen with each breath. On the twenty-ninth day he had dryness, with a sensation as if the mucous membrane was swollen. On the fortieth day, the nose being dry and smarting, and on the forty-first he had a peculiar sensation as if the nostrils were of parchment, and rigid. Towards the end of the proving the nose became very sore; and on the fifty-fifth day there was dryness, and the passages seemed as if widened, with easy passage of air (*Zl.*, $\frac{1}{10}$ *gr. every fourth day, for eight weeks*).

49*a*. Flow of water from lower part of nose, while at the root dryness extending into frontal sinuses, soreness and excoriation of the dermoid border of nostrils (*Zl.*).

Cases among the Workmen.

50. Soreness at the nose, at the lower (outer) surface of the septum there is a yellow scab, which is increasing. It is chiefly at the junction of the septum with the upper lip. Fluent coryza, especially when at the chrome house and in the open air, going off when at home. In the morning on waking, obstruction of the nose, and bleeding of it after getting up, when washing himself (*A man, aged 25, nine days in the works*).

51. Swelling of both alæ of the nose. Sneezing, with lachrymation of the right eye.

51*a*. Lachrymation generally accompanies the nasal catarrh sympathetically (*Del. and Hil.*).

52. Watery discharge, with redness of the nose, and a fetid smell from it (*Ryn.*).

52*a*. Epistaxis, painful constriction in the fossæ; then running of serous and afterwards purulent matter, becoming gradually thicker; frequent sneezing: the sensibility of the Schneiderian membrane exalted especially in the cold; snuffling; bad smell, perceptible to himself only, and finally perforation as usual (*Del. and Hil.*).

53. Great discharge of thick clear mucus from the nose; when this stops he has headache, pain from the occiput to the forehead (*Brrt.*).

54. Discharge, with swelling, and pains of nose and sneezing (*Hhw.*).

55. Watery discharge from the nose, with soreness, much sneezing, snuffling in speaking (*Mld.*).

56. Nose painful and dry, except in the morning, when a watery discharge took place (*Nyn.*).

57. Clinkers form in the course of a few days, and can then be easily detached; but if pulled away too soon, it causes soreness at root of nose, and intolerance of light (*Hdn.*).

58. Almost immediately on commencing, coryza and epistaxis, which continue (12 *months*, *Hrl.*).

59. The first week at the works he had frequent bleeding of the nose, which returned at intervals for a year, and since then (nineteen years) has been destitute of smell (*Dlln.*).

59*a*. After the usual coryza, &c., perforation, and frequent discharge of the elastic plugs, almost complete loss of smell for seven years (*Del. and Hil.*).

59*b*. Soon after entering the works he had the usual coryza followed by perforation, then the symptoms subsided and he had no return of coryza afterwards. The sense of smell remained and became even more acute than before (*Del. and Hil.*).

Summary.

60. For the first days there is discharge of clear water from the nose with sneezing, chiefly in going into the open air; then soreness and redness of the nose, with sensation of a fetid smell. Then they have great pain and tenderness, most at the junction of the cartilage, and the septum ulcerates quite through, while the nose becomes obstructed by the repeated formation of hard elastic plugs (called by the workmen clinkers). Finally the membrane loses its sensibility and remains dry, with the septum gone, and frequently loss of smell for years. In about two thirds of the workmen the septum was found to be gone, in many cases without their being aware of it. The above process runs its course and the septum is destroyed within a few weeks, or is spread over many months.

60*a*. Delpech and Hillairet report that the perforation of the septum was found to be general among the workmen in France, although the men themselves were mostly unaware of it. The ulceration and loss of substance was preceded by headache, swelling of the nose, 4
sneezing, sharp pricking pains, copious discharge with frequent desire to blow the nose, expulsion of bloody membranous shreds, and at 6
times repeated epistaxis, at others the thick greyish or black plugs 7
[the "clinkers" of our workmen]. The time required for the destruction of the septum was shown in the case of a blacksmith, not one of the regular workmen, but who came to mend one of the cauldrons, during which occupation he was exposed to inhale the dust of bichromate crystals. He was speedily seized with the coryza and attendant symptoms and lost the septum in eight days. The mucous lining of the alæ nasi were at times ulcerated. The coryza, lachrymation, and perforation of septum were often observed without any sorethroat or cough or affection of the general health. In one
case of extensive perforation of the septum, which reached 3 cm. in 18
its long diameter, and extended from the top to the middle of the floor of the nasal fossæ and backwards to the lower border of the perpendicular plate of the ethmoid, the border was greyish and seemed denuded of periosteum; the nasal fossæ ulcerated and with grey 22
crusts here and there. It was remarked that with all this loss of substance there was little pain, and the external form of the nose was

unaltered and the voice not nasal; there was none of the falling in 24 seen in syphilitic cases.

The perforation of the septum is characteristic of the chrome-worker's disease, just as the necrosis of the jaw is of the phosphorus-matchmakers.

No doubt it takes place at that period of the symptoms when membranous shreds and muco-pus striated with blood and the elastic plugs were discharged.

During the height of the inflammatory symptoms the septum presents on both surfaces a vivid redness and vascular injection, some disseminated erosions covered with little grey points, and ultimately a central ulceration covered with brownish-grey bloody matter at its circumference. This gradually enlarges progressively till it destroys the septum in its upper part as far as its articulation with the vomer and the perpendicular plate of the ethmoid, while the antero-inferior part is always left quite intact, which is no doubt the cause why the nose does not fall in. The perforation causes in some cases only a slight nasal hissing in inspiration, and the voice becomes slightly nasal. It is situated always almost exactly at the same point, viz. one and a half to two centimetres above the inferior border of the sub-septum; it is one to two centimetres in diameter. At first it is irregularly rounded, but afterwards, as it grows bigger, it becomes oval. The lower part of the septum, which always remains free from disease, is triangular in shape, with anterior apex directed to the top of the nose; the superior angle is prolonged towards the middle of the level of the lateral cartilages, and the postero-inferior angle on the middle of the floor of the nasal fossæ. From top to base this triangular piece of the septum is from one and a half to two centimetres in breadth. The environs of the perforation in most cases show the mucous membrane to be smooth, pink, and slightly puffed out towards one of the cavities, while on the other side it is greyish, ulcerated, and lumpy. Later on, when the patient has left the works, the puffing and lumps are wanting, and the whole inflammatory process has ceased.

The question arises whether the characteristic perforation is owing to specific action or elective affinity of the drug for the nasal cartilage, or is merely owing to its topical influence as a caustic on the septum, which is not anatomically constituted so as to resist it, and this particular place is destroyed because the stream of bichromate particles is naturally directed to that point by the conformation of the nostrils. Delpech and Hillairet point out that on all other parts of the nasal fossæ the Schneiderian membrance is rich in epithelial cells, which are constantly renewed, and in mucous glands which lubricate and protect it against acrid particles, whereas the septum is clothed with a very thin membrane scantily supplied with glands, and much exposed to irritants, and less able to resist their necrotic action. Accordingly it is liable to suffer and become even perforated from other caustic agents, such as the arsenical green, of which some cases are given. These, however, are less marked than the chrome action, owing to the more powerfully caustic action of the latter. They therefore conclude that the perforation is merely caustic and mechanical and not specific. No 73

doubt, I think, the above facts show that the action is to a certain extent merely topical and caustic, but still there must be a certain specificity, for the lower part invariably escapes injury, which shows a certain elective affinity; for no doubt it must in time have abundance of chromic particles touching it for long after the upper part is gone. We may therefore conclude that the action is specific and vital, though the susceptibility of the lower portion is less than that of the upper part of the cartilaginous septum, and the former shares the vital immunity of the other parts of the nasal fossæ after the primary effect of the drug.

Although chrome-rhino-necrosis resembles to a certain extent the syphilitic and scrofulous affections, yet there is a marked distinction in that in the former the destruction stops short at the partial destruction of the septum, whereas in the latter the ulceration spreads in every direction, so that the whole cartilage is destroyed, and the bones at the base attacked and the nose falls in.

The absence of fetor in the affections of the nose among the workmen is noticed by Delpech and Hillairet as general and remarkable; the few cases where fetor was perceived given by me and them are evidently exceptional. This no doubt arises from the strongly antiseptic nature of the pathogenic agent, but in the provings with small doses internally and not antiseptic, fetor appears among the specific effects.

With respect to the loss of the sense of smell, Chevallier, Becourt, Clouet, as well as Delpech and Hillairet, agree that, even in those who have been long at the works and affected with complete rhino-necrosis, the sense of smell remains intact except in some rare cases. This is another ground of distinction between chrome disease and the ordinary forms of chronic coryza, strumous and syphilitic necrosis, in which smell is very often perverted or abolished, as given by these authors, but it is hardly borne out by the experience of the provers detailed by me, nor by their own cases, No. 59*a* and 59*b*.

With respect to the question of immunity from subsequent attacks I have noticed that after the first attack and perforation of the septum the workmen often continued at the works for months or years without recurrence of coryza. Delpech and Hillairet make this same remark, and add that they remain to a certain extent protected against common coryza even after leaving the works, as well as to that induced by chrome. But to this they publish several exceptions.

Pathological Anatomy.

In animals, nose stuffed and full of muco-purulent matter similar to that in the trachea; watery and sticky discharge; cheesy masses in nares; reddened mucous membrane softened at spots like ulcerations.

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Fossæ, constriction in 52*a*.

Commentary.

The specific action on the nose is so fully set forth in the foregoing details that further remarks are unnecessary, and the obvious therapeutic deductions will be found confirmed in the clinical department. The immunity described in 59*b* and 60*a* has not been taken notice of sufficiently by practitioners, and I would suggest that K-bi. internally and snuffed up in the 1st or 2nd trit. might be tried as prophylactic of hay-fever. As respects analogous medicines, the feeling of coldness and again heat of inspired air are shown by mrl.; creeping, teu.; tickling like a hair, spi.; the ulceration of cartilage and disease of bone by mer. and aur.; hydrastis and sanguinaria in the general action on the mucous membrane.

Therapeutics.

As might be expected this medicine has been found useful in a variety of forms of acute and chronic coryza and sneezing, either as the single medicine or intercurrent according to the symptoms. Bähr gives it as his opinion that it is only useful in coryza when soreness and ulceration of the nostrils are present, but this is hardly borne out by my experience and that of others. Œhme gives a case where a female, aged 35, had had for seven years very copious watery coryza alternating with a violent choking cough, so that when the latter comes on the coryza stops. After the failure of many medicines K.-bi. did good at once and cured in a fortnight (*Supl.*, Bd. ii, p. 217). In the more chronic muco-purulent nasal discharges it has been frequently successful.

CASE 10.—*Muco-purulent discharge.*—A girl, aged 15, had for a year a copious muco-purulent discharge from the nose; the discharge is worse at night. The nose is swelled and the septum painful to the touch; nose constantly stuffed. K-bi. 6 bis die cured the case in about a fortnight.

CASE 10*a*.—A woman of fifty had, since influenza, two years ago, constant thick yellow discharge ftom left nostril, most early in the morning, and having a fœtid smell after any fresh cold. Also a severe pain up the muscles of the left side of neck to one small spot in the side of the head, brought on and aggravated by blowing the nose. In the left nostril there is a severe smarting pain extending to the malar bone below eye. Little sneezing and no perversion of smell. K-bi. in various dilutions effected a complete cure in two or three weeks. At the same time a solution of ½ gr. of neutral chromate to 1 oz. of water was snuffed up once a day.

Dr. Kitchen has derived benefit from K-bi. in "chronic catarrhs, where there is a yellow or greenish discharge from the frontal cavities, and where there is a discharge of thick mucoid lumps or plugs, arising from chronic inflammation of the nasal cavities." It also comes in again as an intercurrent remedy in some cases of ozœna.

CASE 10*b*.—Chronic inflammation of the mucous membrane of the nose of ten to eighteen years' standing cured by Goullon with K-bi. 3 every other day. "Dryness of nose; constant feeling of being stopped up; feeling of burning and swelling and at times actual swelling of the nose; tensive feeling as if it would burst; hot upper lip; eyes affected; worse in warm, better in cool temperature." (*Allg. Hom. Z.*, 83.)

Even the characteristic hard plugs observed in the workmen are paralleled in the therapeutic action, for Dr. Chaffee cured a case of nasal catarrh of ten years' standing with expulsion of hard plugs every morning. I find in my note-books a case of chronic itching pustules and crusts in the nostrils, with dryness of nose, cured by K-bi. 6 and 3x internally, and gr. j to glycerin ʒiv applied to nostrils.

In ozœna it has also proved curative in my hands by internal use alone, and the same is testified by Lippe. Hughes states he has never seen it curative without the topical use at the same time. Dr. D. Hale reports a successful case of ozœna with polypus with K-bi. 3 internally and 1st dec. snuffed up. Mr. Lord found it successful by internal use alone in horses.

It has also been found useful in chronic scrofulous disease of the bones and cartilages of the nose; also in various perversions of the

sense of smell, and in congestive epistaxis. In secondary and tertiary syphilitic affections it has been useful in my hands. In one long-standing case of disease of the mucous membrane and bones, with perforation of the hard palate and erosion of the septum, it played in its turn an equal part with merc. and aurum.

CASE 11.—*Affection of the nose and throat after syphilis.*—J. C., a woman, aged 53, had venereal disease several years ago, and since then had laboured under the following: sorethroat; short cough, with hoarseness and difficulty of speaking; copious yellow discharge from the nose. She got K-bi. in various dilutions from the 3rd upwards, and was cured after several months.

Liedbeck reports that in several cases of chronic catarrhal affection with syphilitic complications it acted like a charm, while K. hyd. had been of no use. In one of a man who had syphilis fifteen years before and after long mercurial treatment there still remained a troublesome coryza with loss of smell and taste. K-bi. 2 n. m. effected a complete and permanent cure (*B. J. of Hom.*, xv, p. 497).

In polypus of the nose I have had numerous cases of cure by internal and topical use. My usual plan is to give gr. j of the 1st centesimal trituration night and morning, and direct the patient to snuff up a pinch of the same trituration daily or three times a week for a month or two if necessary. In some cases a higher dilution may be given internally while No. 1 is employed externally. Dr. Watzke reports the two following cases:

CASE 14.—One case was that of a man, aged 50, who had been operated on three times in the course of twenty-three years. On its fourth growth it was treated with K-bi. in the 2nd decimal dilution (1st centesimal), internally and externally, with the effect of removing it in eight days. Dr. W. has since lost sight of the patient, so he does not know whether the disease returned.

CASE 15.—The second was that of a young girl. The polypus had only begun to form a few months before. An operation had been attempted but only partially succeeded, and the chief part of the growth and symptoms were still present. It was quite cured within a short time by the same dilution inwardly and outwardly as above. After the lapse of a year and a half there had been no return of the disease.

Hughes reports cases of cure by internal and topical use, and Dr. Ransford gives a case of malignant polypus (*B. J. of Hom.*, xxiv, 304).

M. Frédéricq reports the cure of twenty cases of nasal mucous-polypus by topical use of K-bi. He applies a saturated aqueous solution daily with a small brush to the parts of the growth accessible to the eye for three or four days; then inflammation sets in, and the nose swells and a watery secretion is induced; in forty-eight hours these symptoms subside, and absorption takes place with permanent cure. Sometimes only one application is sufficient (*Med. Circ., Aug.*, 1882).

In nasal gleet and ozœna in the horse Mr. James Moore finds it excellent, used in the same way as for glanders.

In glanders of the horse he has "obtained better results than from any other drug. In one case with a greenish viscid discharge from nostrils, enlarged glands, deep ulceration of the septum which had been condemned as hopeless, the bichromate effected a cure in three weeks." In glanders he gives the bichromate internally in doses of $\frac{1}{10}$ grain, and rubs the lotion into the glands, and steams with a solution of 5 gr. in a quart of water.

In hay-fever Dr. Kitchen, and also Dr. Stens report success. In a family it set in regularly towards end of June with coryza, dull headache, creeping and tickling in eyes and nose with watering of eyes, sneezing, tightness in chest. Under K-bi. 30, symptoms speedily removed, though other remedies had failed to do good. The drug was continued some months, and the disease did not recur next year (Stens, *Allg. h. Z.*, Bd. 81, p. 157). I have also repeatedly used it with benefit during attacks of the disease, but cannot report on its efficacy as a prophylactic, not having given it long enough for that purpose. Dr. Black reports a case of cure of hay-fever with immunity for the rest of the same season, which, however, did not extend to the next year.

Face.

63. On the second and tenth days, slight indistinct painful feeling on right side of the face, especially in the malar bone and towards the ear; same again in eight days in left side. Fifth day, slight drawing pain of short duration here and there on the throat, at first in front between the lower jaw and the hyoid bone, then at the cribriform plate, reaching to behind the ears (*Zl.*, *1st. trit. low dil. daily, for ten days*). Stitches in the left submaxillary bone towards the ear (*Neidhard*).

64. On first day, a digging pain in the rami of the lower jaw, and next day a swelling on lower ramus—an elastic circumscribed elevation under the periosteum, the size of a nut—it began to diminish on the fourth day (*N.*, *a female*, *3rd dil.*).

64*a*. Itching in the whiskers (*Zl.*).

64*b*. Drawing in the two last fingers of right hand, then in the side of the face and right knee (*Zl.*).

64*c*. A peculiar tension of the muscles of the face which makes the features stiff (*Zl.*).

64*d*. Stitch from malar bone to forehead (*Zl.*).

64*e*. Boring pain in left lower jaw in the evening and all next day with some remissions (*L.*).

64*f*. Lower lip swollen and cracked.

Pathological Anatomy.

In animals, integuments of neck dark red, and veins full of blood.

Index (*local symptoms from* 63 *to* 64*f*).

Aged look, 160[13] (cough, &c.).
Anxious countenance, 96[21] (gastro-enteritis) 96*b*.
Paleness, 93 (imm. effects).
Very pale and cadaverous, 96[4] (im. eff.).
— and eyes sunk, 96[25] (dysentery).
— see Mz. concluding remarks.
Sallow complexion, 106, 119, 130, 137[27] (gastric and abd.).
Flushed face, 96[21] (gastro Enteritis).
Flushed face, sudden, in the afternoon, 120 (gastr.).
— and head, 127[18] (abd.).
Heat of the face, 92[10] (im. eff.), 97 (gastr.).
Cold sweat on face, 96[4] (im. eff.).
Heat without redness, afternoon, 97.
Sweat, 127[20].
Burning of skin, as if erysipelas, 205.
Itching and burning of skin, 207.
— of whisker, 64*a*.

Rash on the face, 92^{20} (im. eff.).
Stiffness of face-muscles, 64*c*.
Pains in the face, left side, 204^{1} (genl. pains).
— in infra-orbital ridge, 204^{14}.
— behind the ear and in the lower jaw, with tension of the muscles of the neck, 204^{9}.
— gnawing, in the malar bone and the extremities, 204^{23}, 204^{31}.
— boring, in left jaw, 64*c*.
— bruise pain, in the bones of the face, 200^{24}.
— ,, ,, with sensitiveness, 204^{14}.
— ,, in upper maxilla, below the orbits, 204^{12}.
Expansive pressure in the Zygoma, 202 (genl. pains).

Succession.

Pain in one side of face, and after some days in other, 63.
— in hand, then face, then knee, 64*b*.
— from malar bone to forehead, 64*d*.

Locality.

Hyoid and cribriform plate, 63.
Submaxillary bones, 63.
Ramus of l. jaw, periosteal swelling, 64.
Lips, dryness of, 136^{17}.
— vesicles, 136^{18}, 205.
— scabby eruption on upper, 226.
— sweating of do., with pain in stomach, 109^{15}.

Mouth.

65. Heaviness across forehead, and in the evening dimness of vision in walking; ulcerations, with indurated edges, and smarting pain on the mucous surface of both lips; dryness in mouth and throat; great thirst; bad appetite; coppery taste; disposition to constipation, and then symptoms aggravated (*Hwe. Ch. W.*).

65*a*. Tobacco-smoking causes burning in the mouth in a habitual smoker (*Zl.*).

65*b*. Vesicular eruption on upper lip. On the mucous membrane of the left angle of mouth a burning vesicle which next day goes on to a small painful ulcer, with swollen hard border; it grows bigger the next day but heals up the sixth day (*Zl.*).

65*c*. Copious salivation, bitter-salt, tough, and frothy, increasing from day to day (*Sch.*, *3rd and 2nd trit.*).

66. After four doses of one grain, on four successive days, he had a partial eruptive swelling of the tongue, which after two days became depressed, and out of its hollow blood oozed for three days. No pain, but his speech was obstructed (*Zth.*).

67. Painful ulcer on the tongue, lasting for weeks (*Ch. W.*).

68. Excavated cicatrix on roof of the mouth, from which a slough separated seven months ago; no pain until separation of slough; sore took six months to heal. The velum presents a rough papular elevated appearance (*Bryn.*, *Ch. W.*).

68*a*. One prover had aphthæ for several days and lividity of gums, which lasted for months (*Arn.*).

68*b*. Sensitiveness in teeth, gnawing at roots; toothache in connection with pains in the bones of the face (*Zl.*).

Pathological Anatomy.

In animals, mouth studded with ulcers, and small, dry, excavated ulcers on tongue.

INDEX (*local symptoms from* 65 *to* 68*b*).

Dryness of the mouth, 88 (im. eff.), 168 (gastric and renal).
— ,, and throat, 65.
— ,, and lips, 136[25] (abdominal).
Flow of water in the mouth, 12 (Head), 80, 82, 91, 93, 94 (im. eff.), 98, 111[7].
— ,, with pain in the stomach, 17 (gastr.).
— ,, in the evening, 135[8] (gastr.).
— ,, salivation, 105, 109[10].
— ,, salt-tasted, 70.
— ,, bitter, 93, 65*c*.
Gaping, 79 (im. eff.).
Itching vesicles on the lips, 136[18] (abd.).
Ulceration on lips, 65.
Vesicles going to ulcer at angle, 65*b*.
Sloughing ulcer on roof, 68.
Tobacco-smoking causes burning in mouth, 65*a*.
Tension in the masseter, 117 (after cramp in stomach).
Toothache, with salivation, 114 (gastr.)
Toothache and stitches in ears (general pains), 193[5].
Tongue coated, yellow, 103, 130 (gastr.), 137[3], 158 (cough).
— ,, yellowish white, 119, 137[25]. (gastr.), 159 (cough).
— ,, white, with taste and appetite good, 127[9] (abd.).
— ,, brown fur, 78, 144 (catarrh).
— dry and dark brown, furred, 96[30] (gastro-enteritis).
— dry and thickly coated, 123 (gastr. and abd.).
— clean and red, 77*a*.
— smooth, red and cracked, 125 (dysentery).
— burning at tip, 99.
— pricking, stinging pains in, 135[1] (abd.), 69 (throat), 65*b*.
— eruptive, bleeding swelling on, 66.
— ulcer on, 67.
— as if a hair on, 69,
— papillæ long, 78.

Commentary.

Ulceration of the mouth and hard palate and lips appear both in the provings and in the experiments, and the sores are of the same character as those on the hands and feet exposed to the solution. It is not immediately obvious whether these are mere topical effects of the irritating dust or more specific. But the prover's symptoms 65*b* and 66 show some specific action. The tongue was, as a rule, more or less thickly coated with yellowish fur, especially at root. This is therefore not repeated in each group, but merely the more special appearances indicated in their proper place. S. 66 shows idiopathic action and probably indicates its use in inflammatory states of the tongue. The teeth seem only acted on in conjunction with rheumatic states. The medicines analogous to S. 66 seem to be mer. and lah. To 57, cic., and to the state of velum at 68, mez.

Therapeutics.

In my own experience I have chiefly found K-bi. useful in chronic ulcerations of the tongue, both syphilitic and non-syphilitic. In one case the ulcers were flat with white scurfs.

Schlosser reports a case of secondary syphilitic ulcer on the edge of the tongue the size of a threepenny piece, excavated, and with yellow base; slightly painful on smoking and drinking beer. K-bi. 3 cured it. —*Œhme* i, p. 560.

Dr. Pope reports a case of inflamed gums, looseness of teeth, with much gastric disturbances, debility, and emaciation, cured by K-bi., 3rd trit. 4 hourly.—*B. J. Hom.*, Oct., 1853.

Drs. Rousseau and Magitôt recommend chromic acid in various forms of chronic fungus and inflammation of the gums, in dentary alveolar osteo-periostitis, in stomatitis, simple and ulcerative, aphthæ, and epulis.—*Practitioner*, April, 1879.

Sir J. Paget says that a most useful local local treatment of gouty psoriasis of the tongue is to paint the white patches with a saturated or very strong solution of chromic acid.—*Clinical Lectures and Essays*, p. 273.

Butlin found a solution of chromic acid, ten grains to the ounce of water painted on the sore areas of the tongue three or four times a day, very useful in chronic superficial glossitis which is mostly due to excessive smoking or drinking, often combined with syphilis. In cases of secondary syphilitic ulcerations of the tongue, small and deeply jagged, after corrosive sublimate and hydriodate of potash in full doses had failed, the above solution applied evenly effected a cure in a short time. Flat mucous tubercles of secondary syphilis were also cured in the same way. As a conclusion from experience in twenty-seven cases he states that "Chromic acid cures with marvellous rapidity *secondary* syphilitic affections, ulcers, mucous tubercles, and condylomata, but produces no appreciable effect in tertiary affections, gummata, extensive ulcers, and tubercular syphilides. As an exception to this last general statement, however, he gives a case where after primary syphilis twelve years before, deep, small, ragged ulcerations formed at the tip and borders of the tongue and were feared to be cancerous. Here 2½ gr. Hyd. c. cret. daily, and painting the ulcers with the above solution of chromic acid effected a cure (see *Practitioner*, March, 1883, p. 175). Butlin states that he is unable to form a clear idea of the *modus operandi* of the medicine in these cases, but the pathogenic action of the K-bi. and the following clinical observation justify us in regarding it as homœopathic specific, for soon after reading the above cases a middle-aged lady came under my care with swollen, flabby tongue and white coating of elongated papillæ, attended with much burning and smarting pain and feeling as if scalded on movement of tongue, and on taking anything at all warm, or salt or spiced. There was no history of syphilis. To test whether the action was escharotic or in any way chemical, I gave one drop of the 1st centesimal dilution of chromic acid every four hours. In ten days she reported herself free from pain or uneasiness, and the appearance of the tongue was almost normal. She felt relief from the first dose.

Throat.

69. Stinging pains in the tongue first day, and on the fourth, sensation of a hair at the back of the tongue and velum, lasting a considerable time, and not relieved by eating and drinking; felt for some days, and ending in sorethroat in the morning, which went off in the course of the day (*Nn.* $\frac{1}{50}$ *gr. six days, several times a day*).

70. At first no symptom. Then about the tenth day the salivation,

which had existed slight before, became a notable symptom. the tenth day, three hours after $\frac{3}{10}$th gr. of the salt, he had difficulty of swallowing. The salivation was troublesome caused frequent hawking and spitting; worse after smoking. day dryness of the throat, with a little pain in empty swallo This dryness soon gave place to the usual mucous secretion, a saliva tasted salt. On examination the soft parts of fauces s slightly reddened, and the uvula elongated; and he ha sensation of a plug in the throat, which would not go aw swallowing. The same continued for three days. The sali continued for ten days longer (*Schwarz.*, *1st dil. for ten days da*

71. On the fourth day, pain in the throat on awaking; sore on sw ing or speaking, considerably increased by motion of lowe extending to the ears; the fore part of the palate slightly red. day, at noon, sorethroat worse. In the fore part of the pala single circumscribed spots of the size of a barley-corn, coloure as if little ulcers were about to form; cough and copious blu white salt sputa. Next day, sorethroat lessened, and the foll day gone (*Mz.*, *2nd trit. one dose daily for five days*).

72. On the fifth, sixth, and seventh, he had sorethroat, as if of a prickly body (*A.*, *inf. dose*, *one daily for twelve days*).

73. Sharp shooting pains in the left tonsil towards the ear; re by swallowing (*Dle.*, *first week 1st dil.*).

74. Relaxed uvula and injected fauces, without uneasy feelings (*Se Ch. W.*).

75. Long-continued erythematous blush of the fauces and soft p varying in hue from a dark to a bright red; occasionally of a co colour (*in many*, *Ch. W.*).

76. On the root of the uvula, on the right side, an excavated half the size of a split pea, with a reddish areola, and contain yellow tenacious matter; fauces and palate presenting an er matous blush (*Che.*, *Ch. W.*).

77. The uvula and tonsils became red and swelled and painful, finally ulcerated, and were suspected by a surgeon to be syph (*Hry.*, *Ch. W.*, *three days after exposure to the solution*).

77*a*. A workman, æt. 30, had for three months ulceration of the th the tonsils and fauces covered with a pultaceous ash coloured li the surrounding mucous membrane brown, livid, and tume Pulse 120, small, and contracted; violent thirst, loss of sleep, to dry, clean, and red, deglutition difficult; anæmia, exhaustion, emaciation. It was pronounced syphilitic in spite of the deni the patient, until his occupation was discovered and other work were found suffering in the same way (*Heathcote*, *Lancet*, 185 152).

78. Awoke with sorethroat, pain being at the palate; cough dense transparent small lumpy sputa, easily expectorated; to covered with a thick loose fur; the papillæ very long on the dor with a brown coloured patch; sorethroat went away in an h the cough continued occasionally during the day (*Nn.*, 20 *to* 60 *1st dil. several times a day*, *tenth day*).

78*a*. Dryness of throat compels to empty swallowing. Burning on deglutition, but the throat not reddened (*Nn.*, *3rd dil. second day*).
78*b*. Transient stitches in the throat, also excited by empty swallowing (*Mz.*).
78*c*. Smarting and tingling in the fauces and heat down the chest (*Hln.*).

Pathological Anatomy.

In animals, water swallowed with a peculiar noise; upper two thirds of gullet dark red and thickened externally, while mucous membrane destroyed by ulceration, and could be easily scraped off, lower third studded with elongated elevated ulcers. Intensely reddened at cardiac end, and with fleshy elevations at upper part.

INDEX (*local symptoms from* 69 *to* 78*c*).

Cool feeling in the fauces, 81 (im. eff.), 97.
Dryness, 70, 78*a*, 168 (renal) 96^{10}, 109^{2}.
— and heat with thirst, 96^{10} (im. eff.).
— with frequent swallowing, 149^{7}.
False sensation of a prickly body, 72.
— food in the gullet, 135^{10} (gastr.).
— plug, 70.
— a hair on velum, 69.
— a cool feeling in hinder wall, 81, 97.
Sensation of something sticking in the throat, 116 (flatulence).
Painless undulating sensation from the epigastrium up the chest, 97.
Hawking of mucus, 48 (nose), 70, 105 (after meals), 111^{24}, 127^{1} (gastr.).
— tough white sputa, 106 (gastr.).
— coated with grey matter, 77*a*.
Heat, 95 (toxic).
Redness, 70, 71, 74, 75, 76, 77, 106, 144.
— dark or livid, 73, 75, 77*a*.
— injection, 74, 158.
— red spots, as if ulcers were forming, 71.
Tickling and pressing from throat to choanæ, 44 (nose).
Scratching and scraping in the throat, 88 (im. eff.), 111^{24}, 127^{1} (gastr.), 171^{11} (fatal).
— causing cough, 81, 149*a*.
Ulceration, 76, 77, 77*a*.
— supposed to be syphilitic, 77, 77*a*.
Swallowing, difficult, 81 (im. eff.), 77*a*, 70, 81.
Swallowing, painful, 144 (coryza), 78*a*, 71.
— with a stitch in right lung, 150.
— frequent, 78*a*, 149.
— empty, painful, 70, 78*b*.
Swelling, 77*a*, 73, 77.

Pains.

Burning in the gullet, 79, 96^{10} (im. eff.), 129^{10} (with headache), 78*a*.
Burning and smarting, 78*a*, 149^{6}.
Shooting, 73, 78*b*.
Painless, 74.

Conditions of Pains.

Speaking, 71.
Moving jaw, 71.
On awaking, 71.
Swallowing better by, 73.
On passing flatus, feels as if something were sticking in throat, 116.
Pains with—
heat down chest, 78*c*.
anæmia, exhaustion, and emaciation, 77*a*.
Pain extending to ear, 73, 71.
Shooting from left hypochondrium up to the neck, 110.
Uvula, 74, 77, 106.
— elongated, 70, 74.
— abscess, 179*c*.
— ulcer, 76.
Velum, 69, 78.
Tonsils, 73, 77, 158.
Tension of the muscles of the neck, 204^{10}.

Commentary.

Inflammation of the throat and gullet are well marked and specific. The acute form tending to ulceration is seen, but probably the more characteristic is the chronic and indolent form with dark redness and formation of ulcers, altogether showing much resemblance to syphilitic sore throat, in which, therefore, it may be may be expected to be curative.

Also in chronic inflammation and thickening of œsophagus. The medicines analogous to "hair on velum" are na.-m. and sil.; broad prickly body, aco.; tonsil pains relieved by swallowing, ipec., iod., nux.

Therapeutics.

The great expectations raised by the pure symptoms have been amply confirmed in my practice. It is most useful in those cases of acute sore throat where there is not much swelling or vivid redness, but which tend speedily to form small ulcers on the tonsils or velum. In fact, I use it in almost all cases of acute ulcerated sore throat as a gargle in the proportion of gr. ij to ℥x of water and ℥ss of glycerine, every four hours; often at the same giving internally aconite or belladonna or some other medicine according to the symptoms, alternately with the gargle. In cases of quinsy the same gargle is useful when the abscess has burst. In chronic sore throats it is equally efficacious both inwardly and in gargle as above.

Dr. Moore reports a case of chronic affection of the fauces and larynx with hawking of bloody sputa and smarting from exertion or reading, worse in damp air. Dr. Pröll gives a case of aggravated follicular pharyngitis, which was mistaken for phthisis, cured by K.-bi. in various dilutions.—*Brit. Journ. Hom.*, xxxix, 255.

I find good results from the neutral chromate in the 1st trit. in the swelled tonsils and deafness of children and older persons, especially in those indolent enlargements where there is little perceptible inflammation and the patients are of fleshy leucophlegmatic habit of body with foul tongue, and thickening also of the nasal mucous membrane and disposition to scabby nostrils.

CASE.—A stout, red-faced man of fifty had, for many months, swelled tonsils, and the neck outwardly thick below the angle of the jaw. The Eustachian tubes seem to be blocked up, and he is very deaf, so that he could not hear a watch, except very close to the ear. One grain of 1st decimal trit. of K. chrom. neutral, was given every night for a fortnight, when he could hear ordinary conversation, and in three weeks more he was well.

The value of this medicine in syphilitic sore throats is attested by myself and numerous observers. Case 17 of second edition was one of secondary syphilitic sore throat with ulceration of the fauces and perforation of the velum, cured with K.-bi. 3, but the hole in the velum remained permanent. Dr. Watzke reports several cases of cure of syphilitic sore throat with swollen dirty-red amygdalæ, violent pain in swallowing, but little fever. Nash and Miller report a case of syphilitic ulceration of the velum which looked at the edge as if bored through with a gimlet. Lippe reports success in both the common syphilitic sore throat and those rarer forms which tend to eat away and destroy the uvula and soft palate; also in syphilitic ulceration of the tongue. Hughes agrees with Watkze, Russell, and myself, as to its value in chronic inflammation and ulceration of the throat even in syphilitic subjects, but he says "it will not arrest the destructive action sometimes set up (in syphilis) requiring mercury and iodine." I agree that there are cases it will not arrest and which yield to mercury or iodine.

Meyhoffer recommends K.-bi. internally and locally in syphilitic

ulcerated throat as an intercurrent remedy when mercury has to be intermitted. See also abstract of Güntz at section syphilis.

Hirsch reports a case of inflammation of the œsophagus. For some weeks before, the patient, a delicate woman of sixty, had sudden flow of clear water from the nose in drops, and suddenly ceasing. Then came on a violent burning in the gullet and distension of it, so that swallowing food was difficult and painful. She would not take solids, for they left a very uneasy feeling as if they remained sticking in the œsophagus. K-bi. 3, bis die, effected a cure.—*Œhme i*, p. 241.

We may here extract the information bearing on K-bi. from Vulpian's "Dernière Maladie de M. le Comte de Chambord" (*Gaz. hebd. de Méd.*, 14th Sept., 1883). About four years before, the Prince had been subjected to a rigorous Banting *régime* for obesity, and from that time had suffered more or less from dyspeptic disorders. In March, 1883, after confinement to bed on account of the rupture of a muscle or vein in the leg his digestion was still farther deranged, although on the 20th of May he weighed 208 lbs. On the 13th June, after dinner, at which strawberries somewhat spoiled had been eaten, he was attacked with indigestion, vomiting, and purging, and a train of gastric symptoms, which continued with varying intensity till his death, on the 24th August, 1883. The symptoms were: loss of appetite; frequent nausea and vomiting of mucus and food, but not blood; severe pain in the stomach after ingestion of even a spoonful of liquid, and tenderness on pressure; colicky pains aggravated after all food, loss of strength and weight, &c. When seen by Vulpian on 15th July, and up till the 17th, when the bichromate was begun, the symptoms were excessive thirst, dry throat, mouth, and tongue, and redness of the mouth and edge of the tongue, and slight appearance of thrush, acid reaction on tongue; swallowing without difficulty, but attended with an uneasy sensation apparently from the dryness of the fauces; about ten to fifteen minutes after swallowing food or drink pains in stomach, which rapidly attained great violence and soon began to subside if nothing fresh was swallowed; the vomitings seldom came immediately on swallowing food or drink, but generally just after the pains had reached their greatest intensity; there were also frequently vomitings in the morning fasting; the matters vomited were mucus or food distinctly acid. Bowels costive and nutritive enemata not well borne. Great debility, face sunken and pale yellow, pulse weak and irrregular, respiration and urine natural, legs slightly œdematous. *Physical signs.*—On the 24th of June Drs. Mayr and Drasche had already recognised the existence of a tumour in the epigastrium which was confirmed by Billroth a few days after. When re-examined in company with Vulpian, on 17th July, it was described as a deep-seated swelling in the epigastric region towards the right of the median line; it was flattened and with ill-defined borders, tender to touch, and very painful to firm pressure, capable of slight displacement laterally, and it seemed to be contiguous to the inner surface of the abdominal wall. In accordance with these signs and symptoms, and considering that the Prince's uncle, the Duc d'Angoulême, had died of cancer of the stomach, Drs. Vulpian, Drasche, and Mayr pronounced the case to be one of cancer. Vulpian stated precisely that the neoplastic tissue was developed in the mucous membrane of the anterior part of the stomach in a patch reaching to a certain distance from the pyloric orifice. Drs. Drasche and Mayr hesitated to place the neoplasm in the stomach on account of the absence of bloody vomiting, but stated that it was in "the region of the stomach." They all, however, agreed upon cancer, in spite of the acute course of the disease and the absence of hæmorrhage. Vulpian recommended as treatment, milk diet and pills of bichromate, containing gramme 0·01 [about $\frac{1}{6}$th grain] of which 3, gradually increased to 9, were to be given daily, after a cup of milk. At the same time an ointment of pot. iod. and ext. bellad. (4 grm. and 6 grm. to 30 grm. vaseline) to be rubbed into the epigastrium; which was agreed to. For the next two days there was a great aggravation of the pains and vomiting, and the pills were suspended till the third day, when they were resumed. A considerable amendment then took place, and for the next two or three weeks the vomiting ceased, and the pains and tenderness disappeared. The digestion and general strength improved also in a notable degree. But the tumour was not lessened, and the patient continued to lose weight. On the 8th August, without any assigned cause, the

vomiting returned; the digestion and strength failed, and he died on the 24th of August. At the autopsy performed by Kundrat in the presence of the above-named medical men, there was found no tumour; what caused the appearance of it in life was a thickened portion of the mesentery, which was also loaded with fat. There were also a number of enlarged lymphatic glands, the size of spanish nuts; they were merely inflamed with no cancerous or sarcomatous degeneration. The stomach appeared somewhat dilated, but its walls were everywhere soft and pliable, without any induration; the pyloric orifice was not contracted. There was an old band of adhesion between the lower edge of the liver and the duodenum. The internal aspect of the stomach showed the ordinary appearances of gastric catarrh; here and there patches of vascular injection, and several small ulcerations about an inch from the pylorus. But the chief seat of morbid change was the œsophagus; the upper part showed nothing remarkable, but the lower part was in a state which struck them all with surprise. From the beginning of the lower fifth, and extending to the cardiac orifice the internal surface showed several ulcerations, of which some were of considerable dimensions, of a greyish black colour, sharply contrasted with the white grey of the sound parts. They were of a rounded shape; the upper ones elliptical in the longitudinal direction of the œsophagus resembling the typhoid ulcer in the healing stage; these were 2½ centimètres long, and 1½ broad. The lower ones were more regularly circular, and 1 centimètre in diameter; near the cardia were two larger oval ulcers, which embraced nearly the whole circumference of the œsophageal canal. At these ulcers the mucous membrane was destroyed and the dark base formed by the muscular coat tinged with dark pigment, but it was not thickened. The borders of the ulcers were not raised, but they seemed punched out perpendicularly. The other organs showed nothing special to the case.

The complete error of diagnosis was admitted frankly by all the medical men, and the chief lesion declared to be the ulceration of the œsophagus and stomach, and catarrh of the latter. From this Vulpian considers that recovery might have taken place at least as far as was compatible with the atheromatous state of the arteries, the fatty heart and slight atrophy of the kidneys which were also present. He thinks the good effects of the bichromate were palpable in the above amelioration which took place, but he can give no probable reason for the relapse that took place on the 9th August. On the above rare and interesting case I would remark that the bichromate was strikingly homœopathic to the principal morbid state. The morbid appearances corresponded very closely to those shown in the experimental record, p. 466, where we see that the lower part of the œsophagus was studded with small ulcers, while in another case it was intensely reddened at the lower end, while the cardiac orifice was inflamed and ulcerated. The stomach also was inflamed and overspread with deeply penetrating ulcers except at and near the pylorus as here. The mesenteric glands were inflamed in experiments 27, 28, and 26. These facts, taken in connection with the œsophageal symptoms under sections throat and stomach in the provings such as the pains and dysphagia and the curious symptom 97 show an idiopathic or locally specific action on that part, and therefore we should expect that it would be homœopathically curative in this case as in the above less severe case by Hirsch. Why then was the effect imperfect and transient? From the faulty management of the dose, I think. As shown at p. 502, the bichromate is a powerful emetic in doses of ⅛th to 1 grain, and in greater doses is an irritant and corrosive poison, yet Vulpian gives from ½ to 1½ grains a day in a case of a lesion closely resembling that produced by this medicine attended, with pains and frequent vomiting. The consequence was a violent aggravation at first, and then when a partial tolerance was established remarkable amendment, to be followed again by the relapse which Vulpian finds so mysterious. That this should happen under doses which had been apparently well borne on the preceding days is no proof that it was not from excessive dosing, for in the provings we find vomiting as well as many other symptoms only came on after continuing for some time an apparently inert dose, *e.g.* symptom 111, where, after $\frac{1}{100}$th grain daily, vomiting came on the eighth day. It is true that Vulpian here, as in his experiments with K.bi. in stomach cases at p. 516, resorts to the stupid and bungling expedient of giving it with or after food, as is often done in respect to arsenic in this country, whereby an unknown amount of decomposition, and possible formation of inert compounds takes place by mixture with the food. Probably the amendment was owing to the mitigation of

the dose thus produced, till finally the cumulative effect of what escaped decomposition induced the second aggravation, and extinguished all chance of cure. Surely if the specific effect of a drug is desired, it is mere common sense to give it on an empty stomach, so that it shall be as little changed as possible, and to moderate the intensity of its action by simply reducing the dose to hundredths, thousandths, or even millionths of a grain if necessary, rather than by the clumsy expedient of mixing it in a heterogeneous mass of food.

Diphtheria.—I have found the best results from the topical use of K-bi., one fifth of a grain to the ounce, either as spray or gargle or by swabbing. It is one of the best antiseptics and at the same time acts specifically on the mucous membrane in the sense of being homœopathic to the exudation. It is not, however, profound enough in its constitutional action to meet the whole disease, and therefore it is best to alternate some other medicine with a closer affinity to the constitutional disease, such as canth., phos., apis, crotalus, phytolacca, merc. cyan., ail, &c. The most satisfactory cases I recollect have been with phos. and with canth. alternated with the topical use of K-bi. But I have not seen virulent epidemics of this disease such as seem more common in America than here. In a recent case of diphtheria developed during convalescence from typhoid fever, the above K-bi. gargle acted most satisfactorily in clearing away and keeping down the false membrane, alternated inwardly with at first belladonna and then apis mellifica. Our American colleagues report favourably of K-bi. Dr. Phillips reports the treatment of ten cases during an epidemic in New England: "The first three died under the ordinary remedies, including K-bi. 3x. When, however, the latter drug was used in as strong a solution as could be taken without causing vomiting, it proved so effectual that the remaining seven cases all recovered."—*Brit. Journ. Hom.*, xxxviii, 261.

Dr. Joslin esteems K-bi. 1st to 3rd trit. the principal remedy.—*Brit. Journ. Hom.*, xxxix, 349.

Dr. L. Newton found K-bi. 3 dec. internally and gr. ½ to Aq. ℥viij topically, curative in those cases where the false membrane was extensive, when succeeded by canth. for the general depression.—*M. Hom. R.*, July, 1870.

Ludlam considers it indicated when the deposit is of a firmer texture and when it extends into the larynx; and when there is an evident tendency to ulceration and deposit upon remote mucous membranes, as, for example, those of the uterine system. "In my own experience this remedy is almost specific to diphtheritic formations upon the free uterine, and to those found upon the respiratory epithelial, surfaces."

Hughes considers K-bi. to be indicated when the deposit invades the nares.

Bryce found it useful when the characteristic yellow-brown fur on the tongue was present.

Tietze recommends it when the false membrane threatens to invade the larynx, and he considers he has warded off that danger by K-bi. 2.

Hirsch holds it to be indicated when there is increased redness and sensitiveness of the still healthy parts of the mucous membrane, and also when the disease threatens to spread to the larynx.—*Zsch. f. hom. Kl.*, 17, 53.

Nausea, Vomiting, immediate, and toxic effects.

[As this medicine is of an acrid and chemically irritant nature, and also a powerful and certain emetic, the immediate effects on the taste, mouth, throat, and stomach, are little characteristic of the peculiar dynamic and specific character of the action of the substance, if the dose is comparatively great. These effects are, therefore, arranged together, and a sufficient number of examples given to show distinctly their nature; but to save useless repetition they are often omitted. It is to be understood, that when the dose amounted to from $\frac{1}{6}$th to 1 grain, vomiting was generally produced, and often prevented the development of any further symptoms; or if not, some of the symptoms in this division preceded those described in other places. However, some of the groups which are necessarily arranged here from the magnitude of the dose, contain very valuable and characteristic symptoms which succeeded the vomiting or the shock to the system caused by the poisonous dose.]

79. Immediately, sourish salt taste in the mouth; disgust for food; nausea; slight burning in gullet; constant gaping; in half an hour strong pressive pain in stomach, with great nausea and inclination to vomit, which was with difficulty repressed (*R.*, 20 *gr.* 1*st trit.*).

80. Scarcely had he taken the drug than he had strong nausea and metallic taste, continued eructation without vomiting, and great flow of water in the mouth (*Kostler*, $\frac{1}{100}$*th gr.*).

80*a*. Immediately after taking third of a grain, disgust and repulsion to this drug and a cool salt astringent, metallic and long-lasting bitter taste, with salt eructations lasting a quarter of an hour. Half an hour after, while walking in open air, unusual fatigue and heaviness of the limbs like lead; indifference, bad temper, disinclination for business, and desire of repose (*Schw.*).

80*b*. Nausea and hot rushing up from stomach and watering of mouth (*M.*, 1*st trit.*).

81. Two or three minutes after taking the dose, he had a cool feeling on the hinder wall of the pharynx. This increased to a dry scratching, which caused repeated painful cough for a few minutes. This was felt every time he took it; and also on the third slight difficulty of swallowing spittle. Then he had a few empty eructations, and in about a quarter of an hour some slight griping. After the above, in five minutes, on fourth day, he had a slight dull uneasiness in stomach, empty eructations, and rumbling in the bowels (*Schl.*, *l. d.*, *one dose daily*, *four days.*).

82. Nausea, heaving at the stomach and shuddering, with flow of water in the mouth, sensation of coldness in the stomach, and want of appetite (3j, 1*st dil. Dle.*).

82*a*. Nausea, vomiting of bile and mucus, with rasping in throat, pains in stomach, and a feeling of internal coldness in stomach and bowels which was distressing; loose stools (*Nankivel*, *M. Hom. R.*, *July*, 1870, *after* 1ˣ).

82*b*. Astringent feeling and flow of water in mouth. Soon pain in stomach and cold feeling in it which soon goes on to contraction, hindering breathing (*A.* 1*st dil.*).

83. Half an hour after taking 15 gtt. 1st dil., sickness and great inclination to vomit, and slight chilliness (*M. J.*).

84. Eructations, nausea, giddiness, and feeling of heat all over the body; then hunger, but disgust after eating a little (*Mz.*, 10 *gr. 2nd trit.*).

85. Soon after, while walking in the open air, he had discomfort in the stomach increasing to nausea, even to faintness, and desire to vomit, but could not; and after some hours, sour eructations and griping in the bowels. The sour eructation returned twice the day after the dose was taken (*Schl.* $\frac{6}{10}$ *gr.*).

86. Immediately, disagreeable metallic taste and uneasy sensation in the stomach. Nausea like sea-sickness, an indescribable sensation of gentle tearing and constriction in the stomach, with slight rushes of blood to the head at intervals—accompanied by great weariness and exhaustion—so that after trying a couple of hours to overcome it, and the bad taste and uneasiness in stomach (increased by walking) he was obliged to lie down and slept two hours. In the rest of the day he still had the sweetish metallic taste, and water tasted bad, but food right (*A.*, 15 *gtt. 1st dil.*).

87. The nausea was compared by many others to sea-sickness, lasted all day, and was excited or aggravated by moving about.

88. He awoke in about two hours with great uneasiness in stomach, and soreness and tenderness in the region of the same, particularly in a small spot towards the left of xyphoid cartilage. The pains continued for some time, with dryness of the mouth, nausea, restlessness and heat of the hands and feet; then perspiration of the hands, feet, and legs, followed by subsidence of the symptoms for about two hours, when they occurred again as before. The above returned slighter on the third night after the drug had been omitted (*Dle.*, *after* ʒj, *1st dil. taken at bedtime*).

89. He awoke at 2 a.m. with violent sickness, but unable to vomit, and headache, chiefly in the forehead, preventing sleep for about an hour; then it subsided, and he had restless sleep (*Wgt.*, *after* ½ *gr. at bedtime*).

90. Nausea and violent shooting pains in the stomach, then vomiting of the drug (*Xy.*, 25 *gtt. 1st dil.*).

91. Soon after taking it, excessive nausea and inclination to vomit, and flow of saliva, aggravated by motion and sight of food; in two hours, while walking in the open air, deadly sickness, with vomiting of light yellow insipid fluid (*Dgn.*, 1½ *gr.*).

92. Immediately after taking it, while he sat writing, he was seized with giddiness, so that the pen trembled in his hand. He rushed to the window for fresh air, but in a moment he had the most violent vomiting of a white, mucous, sourish fluid; accompanied with frightful nausea and pressive and burning pains in the stomach. Then the symptoms remitted for a little while; but five minutes had scarcely passed when the giddiness and nausea increased to the greatest height again, and the painful vomiting was repeated as before, though less in quantity. At the same time, pain in forehead, burning in eyes, and glowing heat of face and upper part of the body, while he had an nward cold shivering which continued for three hours. There was a portion of bright red blood, the size of a hazel nut in the vomited mucus. The body was now covered with

anxious sweat, and the burning headache and giddiness increased, and with it he saw objects as through a yellow veil. He took some warm soup, and sat down to finish the letter, when he was immediately seized with vomiting as before, in successive throes, which followed on each other so rapidly that he could scarcely get breath: the matter vomited was yellow, bitter and bilious. For the rest of the day he had headache, and the face broke out in a rash with the straining. Taste bitter, and salt; great thirst. The external flushes of heat and inward cold continued; pain in the breast in deep inspiration; epigastrium sensitive to touch, and the least pressure brings on the inclination to vomit. No appetite. After a short sleep the nausea was gone, but he still felt weary, and heat of the hands and face, while the arms were cold to the touch, and he had inward shivering. He had distension of the abdomen and gurgling in it, as if a fluid stool was going to come; discharge of fœtid flatus. Next few days the fulness in abdomen after eating was the only symptom left (*R.*, $\frac{4}{5}$ *gr.* 1 *dose*).

92*a*. After breakfast, nausea, uneasiness all over, oppressed breathing, tension of muscles of face and burning of the eyes, he vomited the whole contents of the stomach with taste of the food, but no bile; with very painful contractions of the stomach and empty straining (*Zl.*, 1*st dil.*).

92*b*. Dizzy and sick; could not lie in bed, then as if sea-sick, and as though the stomach turned a somerset and as if every muscle in the body was at work to eject the offending substance; the blood-vessels of head seemed full to bursting, the deathly sickness and straining were an agony; bitter matter vomited, but no food; chilly and shivering; cramps in stomach. Next day sore and dull aching at stomach, and slight occasional nausea. Cramp in stomach; desire for stool, but only flatus passed: uneasy and nervous (*Gurney*, 1*st dec.*).

93. In half an hour smart salivation; salt and bitter saliva. In the epigastrium he had a sensation of overloaded stomach, though he had eaten breakfast with relish. This uneasy sensation increased to a violent pressure, then nausea, eructation with a rancid taste; inclination to vomit, and slight griping in upper belly. This was followed by flushes of heat alternating with shuddering; and slight sweating on the back and inside of the thighs. As the nausea increased he became irritable, had paleness of the face, and finally vomiting, with relief of the symptoms (*Sch.*, $\frac{2}{3}$ *gr.* 1 *dose taken after breakfast*).

94. Soon after 40 gtt. 1st dil. nausea and inclination to vomit without being able, with mouth full of water as before sea-sickness; accompanied with vertigo, as if she would feel relieved in lying down; but the nausea continued, and she vomited clear watery fluid. The vomiting was attended with cold perspiration on the hands, and coldness of the body. Then heat over the body with feeling of cold; heaviness in head and transient shooting pains in the temple, worse on lying down. This lasted some hours (*A. B.*).

95. A workman, aged 35, got by chance some of the solution of the bichromate of potash into his mouth; he spit it all out, as he con-

ceived, but scarcely had a few minutes elapsed when he felt great heat in the throat and stomach, and he was seized with violent vomiting of blood and mucus, which continued till within a few moments of his death, five hours after the commencement of the symptoms. On dissection, the mucous membrane of the stomach, duodenum, and a fifth of the jejunum, were found destroyed in patches, and the remaining parts could be easily removed with the handle of the scalpel. The lower part of the intestinal canal was healthy (*Baer's case*).

96. A young man swallowed about 2 oz. of the salt dissolved in warm water shortly after breakfast. In five minutes, vomiting, first of the food, then of a thin glairy fluid of a pinkish hue. In half an hour, face exceedingly pale, cadaverous, and covered with cold perspiration; the pupils dilated and fixed; pulse exceedingly feeble; cramps in the calves of the legs, and almost total insensibility; occasional vomiting, attended with violent epigastric pain. [The stomach-pump, &c., were used till the washings of the stomach became colourless.] The patient now complained of a burning pain at the pit of the stomach, and of a sense of dryness and heat in the throat, accompanied with excessive thirst. Vomiting and straining still occurred at intervals. In about two hours and a half the vomiting had subsided, and he began to assume his natural look. The temperature of the skin rose; and with the exception of slight epigastric pain and dryness in the fauces, he seemed comparatively comfortable. The pulse was 100, and rather full; the pupils responded to light. Mind calm and intelligence undisturbed. Twelve hours after taking the poison, very severe gastro-intestinal inflammation had set in, accompanied with severe cramp in various parts of the body, particularly the calves of the legs and inner parts of the thighs. The skin was hot and dry; cheeks flushed; countenance anxious; pain in the head; pulse 120, hard and full; respiration rapid; epigastrium and abdomen very painful, not bearing the slightest pressure; constant straining and retching. The blood drawn was cupped and buffed. In ten hours the vomiting and cramps had ceased, and the other symptoms less intense, though still persisting; the tongue was also dry and covered with a dark brown fur; pulse 100, hard and jerking; the bowels had not acted; great complaint of the taste of the chromate in the fauces. In the evening the symptoms were all subsiding, and the bowels had acted once. In the night, sixty-six hours after taking the poison, he was seized with violent purging, which continued almost incessantly; the bowels were evacuated as he lay in bed; the evacuations consisted of mucus and blood; when this had lasted two hours he was reported to be "dying," and was found with the skin cold and clammy, face pale, eyes sunk, feet and hands cold; pulse scarcely perceptible; abdomen swollen and tender. Reaction set in in about two hours, and the symptoms gradually subsided towards evening of that day. During the day were observed: excessive thirst; pulse 120; abdomen tender and swollen; frequent twitches in the calves of the legs; straining and purging. Next day the purging returned, but not so violent as before, and the stools con-

tained feculent matter; tenesmus not severe; abdomen very tender in the region of the sigmoid flexure; distension slight; thirst and fever abated. Next day, symptoms subsiding, and bowels acted only once, and stool natural. (*After effects lasting 4 months.*) The convalescence was exceedingly slow, ulceration of the bowels having set in, and with difficulty been subdued. There was considerable emaciation with urgent dyspepsia; bowels habitually costive.

96*a*. Given in small doses such as 0·05 or 0·10 gramme, it is an immediate irritant of the alimentary canal; it gives rise to retching, vomiting, sometimes diarrhœa, loss of appetite, difficulty of breathing and slowness of circulation. In larger doses it produces all the symptoms of acute gastritis; there is urgent thirst and spontaneous and difficult vomiting which is excited by the mildest beverage; the ejecta are mucous, bilious, yellow, and sometimes bloody; at the same time the extremities become cold, there is dyspnœa, great anxiety, loss of appetite, repeated efforts to vomit, then the breathing becomes stertorous and death is preceded by a state of utter prostration (*Jaillard in Allen*).

96*b*. Expression of uneasiness in the face, repeated retching and vomiting, moderate colic, and a little diarrhœa; breathing somewhat difficult; pulse scarcely perceptible, filiform, and very slow; sudden transient cramps in the lower limbs and back of the neck; surface generally cold, especially the limbs (*Jaillard from doses of* ·01 *to* 0·5 *gramme in secondary syphilis. Allen*).

96*c*. A man swallowed "a lump" [about 2 drachms] of bichromate: in fifteen minutes came on lightness in the head, then sensation of great heat in stomach with a glow of heat all over the body, followed by cold sweat. Next sickness and free vomiting. Then agonising pain at epigastrium with giddiness, specks before the eyes and loss of power of the legs. Intense thirst and said "he felt as if he could drink the sea dry." Then rigors with coldness of whole body, especially extremities. After two hours pupils slightly dilated, face pale and cold, pulse feeble and fluttering, intense pain over stomach and great depression (*After the stomach-pump, &c., complete recovery. Dr. McNiven's case. Lancet, 22nd Sept.*, 1883).

96*d*. A man swallowed 3 drachms. Excessive vomiting, purging, and violent abdominal pains with cramps in legs and coldness of the surface. Hands shrivelled, wrinkled, and dusky like a person in the advanced stage of cholera; face and lips dusky with yellowness of conjunctivæ; sore mouth, excessive thirst, feeble pulse, hurried respiration and suppression of urine. Mental faculties unimpaired (*McLachlan's case. Glasgow Med. Journal, July*, 1881).

Index (*local symptoms from* 79 *to* 96*d*).

Nausea.

Nausea, 2, 79, 80, 84, 88, 90, 92[5], 93. 97, (gastr.), 99, 101, 114, 137[1].
— lasting all day, 87.
— like sea-sickness, 86, 94, 92*b*.
— to faintness, 85.
— Sudden, 137[15].

Conditions of Nausea.

Night on awaking, 88.
In the morning (with maziness), 107.
In the open air, 85, 91.
Better in the open air, 109[13].
By pressing stomach and liver, 92[21], 130*b*.
Worse on motion, 87, 91, 100, 107.

Worse at the sight of food, 91.
— during meals, 111[18], 101.
— during breakfast, 111[18], 101, 136[9].
— after meals, 130, 137[15].
— after breakfast (with pain in the shoulders), 136[7].
— relieved by eating, 135[21].
— „ drinking coffee, 99, 105.
— „ „ warm soup, 109[11].
— excited by drinking, 118, 101*a*.
— „ „ but not by solids, 118.
— „ smoking, 130, 128.
— after stool, 127[14].

Concomitants of Nausea.

Irritability, 93.
Vertigo, 11, 94, 92[7], 84, 98.
Headache, 92[13], 89.
Rushes of blood to the head, 86.
Hot rushing up, 80*b*.
Creeping on scalp, 111[13].
Objects seem yellow, 92[14].
Pale face, 93.
Watering of mouth, 80, 82, 91, 94, 80*b*, 111[16].
Eructation, 80.
Pains in the stomach, 79, 86, 88, 90, 99.
Coldness in do., 82, 82*a*.
As if stomach turned over, 92*b*.
Pains in both hypochondria, 128.
Pain in hypogastrium, 101.
Chilliness, 82, 83.
Heat all over, 84.
Heat of hands and feet, 88.
Alternate heats and shivers, 93.
Uneasiness all over, 92*a*, 101.
Sleepiness, 105*a*.
Weariness, 86, 98, 105*a*.
Inclination to vomit, 79, 82, 83, 85, 89, 91, 111[19] (gastr.), 93, 94.
— on pressing the epigastrium, 92[23].
— with diarrhœa, 137[24].

Vomiting.

Vomiting, 90, 91, 94, 99, 137[17], 171.
— sudden, 111[19].
— in successive throes, 92[16].
— great straining, 98, 99, 96[11], 92*a*.
— sour, 5 (vertigo), 10, 92, 108.
Vomiting of blood and mucus, 95, 92[12]
— some bright blood, 92[12].
— bitter, 92[19], 99, 118 (gastr.) 92*b*.
— bile and mucus, 82*a*.
— undigested food, 100 (gastr.) 92*a*.
— easy of food, 111[22] (gastr.).
— clear watery fluid, 94.
— dark brown, 118.
— brownish yellow, 98.
— pinkish glairy fluid, 96[3].
— yellow and bitter, 92[15].

Conditions of Vomiting.

Open air, 91.
Stooping, 5.
Motion, 5.

Concomitants of Vomiting.

Headache, 92.
Bursting, 92*b*.
Shooting in the temples, 94.
Vertigo, 99.
Heat and rash of the face, 92[19].
Rasping in throat, 82*a*.
Bitter taste, 98.
Coldness in stomach and bowels, 82*a*.
Pressive pains in the stomach, 92[5], 96[7], 5, 92*a*, 82*a*.
Burning do., 92[5], 95, 99.
Bruise do., 118.
Painful contraction of stomach, 92*a*.
Drowsiness, 98.
Coldness all over, 99, 92*b*.
— then heat all over, 94.
Cold sweat on hands, 94.
Heat of the body with inward chill, 92[10].
Anxious sweat, 92[13].

Succession of Symptoms.

Nausea followed by coldness all over, 101.
— by hunger and disgust after eating, 84.
— by eructation, 85.
— by general discomfort and pains at pubes, 101.
— by weakness of hands, 105.
— by paralytic tearing at shoulder, 136[11].
— by alternate heats and shivers, 93.
Vomiting preceded by vertigo, 92[2].
— followed by nausea, 100.
— „ by thirst, 118.

Commentary.

The emetic action seems to depend on peripheral irritation of the afferent stomach nerves, and is specific, for it takes place equally whether the drug is swallowed or introduced in any other way. The minute symptoms of the nausea and vomiting will be found to give excellent indications for the morbid states of the mucous membrane of the stomach and duodenum, in which this medicine is curative.

The analogous medicines are: rushes of blood to head at 86 jat;

87. Ars. tab. Nausea with heat of hands and feet, ind. sec. stan.; vomiting with heat of face, nux, ign.; with cold sweat of hands, cam.

Stomach and After Meals.

97. On the fourth day, in the afternoon, he felt a very strong but quite painless undulating contraction in the pit of the stomach, which spread from thence into the cavity of the chest and there ceased; within about five minutes this was repeated several times and then disappeared. (This was to him quite a new sensation, its seat seemed to be in the stomach and œsophagus.) On the fifth, in the morning, before taking any of the drug, he had a cool, sour taste at the root of the tongue and fauces, and nausea for about ten minutes. On the sixth, in the afternoon, without any cause, sensation of glowing heat of the face for half an hour, but it did not look red. Same evening, itching on the glans and at the rectum (*Schl.* $\frac{0}{10}$ to $\frac{8}{10}$*ths four times in seven days*).

98. After $\frac{4}{10}$ths gr. he had nausea and diminished appetite; after breakfast vomiting with much straining, injection of the eyelids and drowsiness. After the lapse of half an hour, again vomiting of brownish yellow pappy matter. In three hours the vomiting returned with violent retching and very bitter taste in the mouth. Nausea lasted the whole day, and occasional griping in the bowels and sudden attacks of vertigo. Third day, transient smart shooting pains in the right temple, lasting two or three minutes and returning at intervals of ten minutes for several days. Loss of appetite, languor, and disinclination to exertion, with nausea and offensive taste and watering of the mouth. Sickness in the morning and yellow bitter vomiting (*Rll.*, *1st dil. several times a day for a week*).

99. In about an hour, burning at tip of tongue, violent pressure at stomach and nausea and inclination to vomit, and actual vomiting of the ingesta half an hour after, with great straining. The pressive pain and the nausea continued the whole day, so that he could scarcely eat anything, and in the evening, after a cup of coffee, he vomited again with great straining and accompanied by vertigo, violent burning pain in the stomach, anxious sweat on the whole surface of the body, and chilliness amounting to shivering. The ejected fluid in the evening was bilious. There remained exhaustion and irritation, which hindered sleep. In the same day he had confusion of the head, especially over the eyes, lachrymation, burning of the eyes, and a feeling as if he were going to have a severe illness (*R.*, 15 *gr. 1st trit. one dose*).

100. After breakfast squeamishness, and in half an hour vomiting of the food, quite undigested and not the least acid; followed by nausea on moving about, for several hours (*X. Y.*, *fifth day*, ½ *gr.*).

101. Directly after taking it, and for at least an hour after, and even after breakfast, he had to contend with nausea. During this there arose heaviness and tightness in the hypogastrium, towards the symphysis pubis, and a general feeling of malaise and disordered

cœnæsthesis ; a very repulsive taste in the mouth ; the nausea lessens after a while, and instead, there arises an unpleasant coolness over the whole body. About midday, while smoking, frequent spitting and slight return of nausea. On the third day, very unpleasant taste in the mouth while smoking (*Zl.*, $\frac{1}{10}$*th one dose daily for two days*).

101*a*. After drinking a glass of water, nausea and inclination to vomit and slight griping (*Zl.*, *2nd trit.*).

102. For several days, sour taste in the mouth the whole day, but the taste of food not affected. Hiccup, loss of appetite, and no thirst ; headache, chiefly in the temples, with uneasiness in stomach and dimness of sight (*A. B.*, $\frac{1}{6}$*th to* $\frac{3}{6}$*th gr. several times a day for four days*).

103. Stomach disordered, with heat of the whole body at night ; yellow-coated tongue ; gnawing at epigastrium. Transient darting pain in the mamma (female) (*X. Y.*, *twelfth day* 10 *to* 60 *gtt.* 1 *dil.*).

104. For the last four days, frontal and occipital headache ; transient pains in the right mamma (male) and left elbow ; stitches in right hypochondrium. On seventh day, acid risings and burning in stomach, several times a day. In the afternoon, salt taste in the mouth. Transient acute pain in left scapula (*Nn.*, *1st trit. three times a day for seven days*).

104*a*. Sour eructations, smelling of chromic acid, though none of the K-bi. had been taken for thirty-six hours (*Schl.*, *after* $1\frac{1}{2}$ *grains in five days*).

105. Generally after dinner oppression of chest, eructations, distension, flow of saliva and expectoration of mucus from the throat, then nausea increased by drinking coffee, all subsiding towards evening, but succeeded on the eighth by extreme weakness of the hands, so that he had to lay down the newspaper. After dinner, shooting in left loin and iliac region (*Lackner*, *1st trit.* 1 *gr. daily for nine days*).

105*a*. Immediately, eructations which lasted all day. In one hour nausea, desire to vomit, prostration, weariness, and sleepiness, with continued, tiresome yawning, rumbling, colic, and passage of fetid flatus. Unfit for his usual occupations, he must lie down, and slept for an hour with relief ; but ill-humour and indescribable feeling of illness and discomfort remained (*Mz.*, 15 *gr.* *1st trit.*).

106. On rising in the morning, heaviness and giddiness, increased on stooping, relieved by walking about ; relaxed uvula and fauces injected without any uneasy feelings ; distension of stomach, sour eructation, flatulence ; disposition to constipation, and when that exists the general symptoms are aggravated ; urine red, with pain across the back ; oppression at the pit of the stomach, with smarting, burning pain, followed by expectoration of tough light-coloured sputa ; complexion pale and yellowish ; feverishness in the first part of the night (*Wfd. Ch. W.*).

107. Occasionally dyspeptic attacks, loss of appetite, food lies like a load, with low spirits and much flatulence, and maziness in the head in the morning, and nausea, with sometimes vomiting of clear fluid (*Br. Ch. W.*).

108. Habitual attacks of sour vomiting, excited by stooping or moving, with pain at epigastrium; pressure in stomach after eating (*Ch. W.*).

109. On the first day, immediately after the usual sour-salt taste and dry throat, he had pressive pain in stomach, which hourly increased to a sharp pain. He had for about three hours the feeling as if he had received a severe blow on the stomach, accompanied with slight nausea and inclination to vomit. In spite of these feelings he sat down to dinner with tolerable appetite, but little thirst, which is unusual for him. He did not relish the wine and water, which tasted bitter. After dinner all the symptoms better, but at night frequent passing of watery, strong-smelling urine. On the second, anxiety at epigastrium, and first watery, then frothy salivation; the nausea relieved by warm soup; the stomach-ache continued throughout the day, so that he could not bear tight clothes. He feels sick and giddy in the room; better in open air. Next day, towards evening, the aching in stomach increased, with a feeling of anxiety in epigastrium and sweating on upper lip. The pain in stomach is confined to a spot the size of a thimble, about a hand breadth above the navel. The fourth day, the stomach pain and thirst for sour things were the only symptoms. Pain in forehead and cold sweat, third day. Confusion of head in right temple, with pressure at root of the nose, first day. Eructation of pure flatus; stool hard and knotty; abdomen for two days (third and fourth), distended and sensitive (*R.*, 20 *gr. 1st trit. twice in four days*).

110. First day, empty eructations and no other symptom. Next day, soon after breakfast, she had intense shooting in the left hypochondrium, which spread up the chest to the clavicle and side of the neck, unaffected by respiration, but increased by stooping. It lasted an hour. Next day (third), the same pain came again and lasted most of the day, at intervals. Next day it was gone (*N.*, *young female*, *1st trit.*, *one dose daily for two days*).

111. The very disagreeable sweetish metallic taste, particularly at the root of the tongue and palate, was felt always immediately after taking the drug; it also returned frequently during the following days, hours after the drug had been taken, particularly after smoking a cigar and after breakfast. It was felt some days before taking anything in the morning. Also emptiness in the stomach, nausea, and flow of water in mouth. On the fourth day, in the forenoon, slight attacks of burning pressive pain in stomach, and again an hour after dinner. It returned on the seventh ninth, and tenth, as heartburn after dinner and in the evening. After dinner aching in forehead and fulness of hæmorrhoidal vessels; in an hour the frontal pain went away and contractive pain in vertex came on. On the seventh, he took breakfast without appetite. At 10 a.m., nausea and creeping contraction of the scalp of the forehead and top of head. Eighth, no relish for breakfast, and during it nausea, which continued with watering of the mouth, and vomiting could with difficulty be kept down. Soon after breakfast the sweetish metallic taste came back, with continued nausea and disgust. In the forenoon, while dressing, the inclination to vomit came suddenly with such violence that he

could not overcome it, but he threw up the whole contents of the stomach in a stream, before he could get to any proper place. This vomiting was without effort and left no bad taste, and soon after he felt so well that he could give his lecture, but had disgust for smoking. Eighth, roughness in throat in the morning, and hawking of thick phlegm. Eighth, in the evening, he was overpowered with sleepiness, and fell asleep on the sofa. On the fifth and sixth he had two semi-fluid stools, and on the eighth, hard knotty stool. The abdomen was distended, with grumbling and griping for the three or four last days (*Zl.*, 1 *dose* 1*st trit. daily for ten days*).

111*a*. The metallic, coppery taste which usually was felt on taking the drug, suddenly came on strong in the root of tongue and soft palate, with nausea and eructations, many hours after (*Lack.*, *ninth day*).

112. For six days he took gr. $\frac{1}{30}$ two or three times a day. Uneasiness at the stomach on the first day; next day nausea. On the fourth he awoke with severe pain in the stomach, which lasted three quarters of an hour: the uneasiness at the stomach lasted all day, and was situated about the great curvature of the stomach, about three inches below the ensiform cartilage: the sensation resembling most the feeling of an overloaded stomach. On the sixth, again the pain at great curvature of stomach, with a sense of weight. Headache at sundry times, generally on one side and at a point that may be covered with the finger (*Nn.*).

113. Dull, cold, heavy pain at cardiac region, with tightness in chest and dyspnœa. Griping in the lower belly, as if something was piercing the bowels, worse on deep inspiration, better on pressure. This lasted for two days (*Ngt.*, 45 *gtt.* 1*st dil.*).

113*a*. Pressure in stomach and a peculiar sensation as if cramp in it were coming on (*Zl.*, 1*st dil.*)

114. After the local effects, on the first day, he had, in half an hour, sour eructations and nausea for two hours. At midnight of the same day [he had eaten fruit ice] he was wakened up with a cramp in the stomach, which kept him awake two hours, and was alternated with similar pinching pains at the navel. During the fore and after noon, next day, he had similar spasmodic pains in the bowels, which gradually became weaker and did not disturb the appetite or stool. Fourth day, toothache, with salivation for an hour and a half (*Schl.*, $\frac{1}{2}$ *gr.* 1 *dose*).

115. On the third day, in the evening, he had sweetish astringent taste, and aching in the stomach, which goes away after smoking, but comes back soon, so that he had to go to bed with it, and passed a quiet night. Next morning the aching in stomach continued in a less degree, though the appetite was not disturbed by it, but even increased (*R.*, 1*st trit.* 1 *dose daily for* 5 *days*).

116. Soon after the dose, pressive pain in stomach, with continual eructation of pure flatulence. At times the feeling thereby as if something remained sticking in the throat on the passage of the flatuence. The pain in stomach was rather sharp and lasted three hours. For the next two days there remained a soreness at epigastrium, rendering it tender to pressure (*R.*, 1 *dose of* 1*st trit.*).

117. Before dinner, suddenly a violent pain in anterior surface of the stomach, burning and contractive, with nausea and flow of water in the mouth, increased by external pressure. In ten minutes it subsided, and in its place came a tension and drawing in the muscles of mastication and more flow of water in the mouth. First day. After dinner violent ineffectual desire to stool (*Zl.*, *gr.* $\frac{1}{16}$ *every four days for eight weeks*).

Pathological Anatomy.

In human subject, see symptoms 95, 171. In animals, mucous membrane of stomach injected and inflamed, except at the pylorus; red-brown places; mucous membrane inflamed at both ends of stomach; at cardiac end violet raised spots and mucous membrane abraded at several places, with inflamed spots near; at cardiac orifice and middle of stomach extensive chocolate-coloured shallow ulcers, but grey deep ulcers penetrating the mucosa over the rest of stomach; rugæ here and there bright red; mucous membrane of stomach and bowels thickened, and displaying every shade of red from dark to bright; also yellowish and easily stripped off; gangrenous patches. The bloody mucous masses in stomach and bowels in Expt. 33 and 39 did not react for chrome.

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Commentary.

The specific action of the stomach and intestines is shown by the fact that the pathological appearances displayed in the experiments were not the result of mere topical action of this irritant and corrosive poison, but occurred however the drug was exhibited. The morbid state consists in irritation of the mucous membrane and increased secretion and perversion of the mucus, which becomes bloody, and the irritation increases to acute gastritis going on to ulceration and gangrene in patches. In the less acute forms there are vomiting, thirst, and various pains in the stomach, and cramp. The functional signs of the less acute forms show a depression of the digestive power and want of secretion of

gastric juice. It is to be noticed that while the greater part of the stomach, and again of the duodenum, were inflamed and ulcerated, the pyloric orifice remained healthy, so we need not expect curative action directly in inflammation or its results of that part. On the other hand, we should expect much therapeutically in acute and chronic gastric catarrh and various forms of dyspepsia with the characteristic coatings of the tongue; also round ulcers in the stomach. Analogous medicines: that curious contraction at 97, probably asa., con., senecio; vomiting with bitter taste, pul.; pain like a blow in stomach, dul., eub.; wine and water taste bitter, cof., pul., sil.; pain in a small spot, lyc., rhs., sab., ter.; vomiting without effort, jat., loi., mez., nux, tab., zin. Appetite increased in spite of pain gn-c.

Therapeutics.

To enumerate all the symptoms and morbid states of the stomach and liver in which it has been found useful either as the sole remedy or in some stage of the treatment would be to recapitulate a great part of the proving. Suffice it to say, it has been found curative in a great variety of forms of dyspepsia and functional derangement as well as chronic inflammation of the stomach and duodenum where the pure symptoms correspond. In its primary operation it seems to depress the secretion of gastric juice, and it has been found good in cases of atonic dyspepsia with flabby tongue, loss of appetite, and uneasiness in stomach, &c. Also in gastric disturbances characterised by nausea and vomiting, in all the variety shown in the proving. The following are illustrative cases:

Case 19.—A fair-haired young man had suffered on the 29th August for a week with the following symptoms, which came on with vertigo and pain in right hypochondrium; he has now pain in the right hypochondriac region, towards the epigastrium, aggravated by touch and by walking; vomiting of greenish watery mucus in the morning; tongue very thick yellow furred; no appetite; no thirst; taste natural; bowels open. K. bich. 6 ter die. On the 1st September no more vomiting; pain nearly gone; tolerable appetite; tongue better. The medicine was continued and he was well before it was finished.

Case 20.—A young lady, aged 14, not yet menstruated, had had for a considerable time the following symptoms: Nausea on moving about or taking a short walk; frequently a sensation of nausea rising from the stomach to the pit of the throat; with paleness of the face, flow of water in the mouth, and coppery taste; with faintness and general coldness, and desire to lie down; she has frequent pain at epigastrium, pricking through to the back, for about half an hour at a time; thirst; brown tongue in the morning; bowels very costive, seldom moved without injections or pills; abdomen distended; constant hunger and craving; milk disagrees; almost daily headache, shooting from back to front; pains in both hypochondria on walking; excessive languor and indisposition to bodily and mental exertion; sleep unrefreshing. She got six powders of K. bich. in different dilutions, from the 18th to the 3rd, and was told to take one every second night. After the second powder (6) the nausea was gone, and gradually all the other symptoms subdued, and she could eat milk, and the bowels acted.

Case 21.—*Dyspepsia.*—W. W., aged 39, had been for eighteen months affected with the following symptoms: He has vomiting of the food, sour, with nausea, coming on an hour after eating; also pain at the pit of the stomach, like a stone; the tongue is white and flabby; the bowels costive; he cannot eat meat, or tea or coffee, as he vomits them immediately. K. bich. 6 bis die. In a week he was improved,

and in three weeks under K. bich. alone, in the 18th, 6th, and 3rd dilutions, quite cured.

CASE 22.—*Vomiting.*—E. D., a girl aged 11, had been ill for two months with the following symptoms: Almost immediately after eating she vomits nearly all her food, sour; she has tolerable appetite; the tongue is red in the middle; bitter taste; bowels rather confined. She had received ipec., cham., ars. and bry., with partial and only temporary relief. K. bich. 6 bis die. The vomiting ceased after the first day of the medicine, and she was quite well within the week.

CASE 24.—*Nausea and Gastric Disorder.*—P. P., aged 37, had had for seven weeks the following: Constant nausea and at times vomiting; she has a choking feeling, like a hair in the back of the throat, that comes suddenly and causes sickness; constant pain tearing at epigastrium, and smarting between the scapulæ; bad taste; tongue white; bowels open; vertigo on rising. Ant. cr. 3 bis die for three days made no change; then K. bich. 6 bis die removed the feeling of a hair soon, and all the symptoms in about a fortnight.

CASE 24*a*.—A middle-aged woman had for four years the following symptoms: After food she has a choking as if there was something hard all down the œsophagus, then a hiccup and a jumping and shaking as if the stomach jerked up, not painful; then a curious feeling as if of something eating into the bowels, then gulping up of food unchanged and not sour, with pain across the back; costive.

This corresponded remarkably with sympt. 97, so K-bi. was given in the 2nd and 6th dilution, a dose every second night, and a complete cure followed. I have had several other cases of cure where sympt. 97 was present.

CASE 24*b*.—A woman, aged 30. Anorexia; fulness at epigastrium; much flatulence; taste of rotten eggs and constant nausea; dislike to fat meat; tongue red and rough; sharp pains shooting all over head; costive; shooting and aching pains in sides and back; general debility and drowsiness in the day. K-bi. 3 four times a day effected a cure, and she was able to eat and relish meat, which she had not done for long (Dr. Hawkes, *Hom. World*, December, 1874) [see sympt. 160, dislike to meat].

I have also repeatedly observed the dislike to and inability to digest meat removed by K-bi. Also dyspepsia with metallic taste.

CASE 24*c*.—In my notebook K-bi. proved curative in the following: After every meal, and not after meat only, screwing pain between scapulæ extending through to sternum and epigastrium, better by lying down and by eructation; comes on also after fatigue.

In dyspepsia, Lippe finds it indicated when there is the feeling as if the digestion stopped after a meal eaten with relish and the food lay like a load; and it differs from nux vom., which has similar symptoms, in that the K-bi. symptoms come on immediately, while those of nux only one to three hours after the meal. Lippe finds it also curative in the dyspepsia of beer-drinkers, and in round ulcers of the stomach, which I can confirm. The same is said by Dr. Clifton, who also gives as indications in dyspepsia the state of the tongue, the dislike to water and to meat, morning nausea, taste in the mouth, pressure and weight rather than pain in the stomach as if the food lay undigested, as these are defined in the pure symptoms. In an illustrative case by Dr. Clifton, in which the above symptoms were present, and in addition rheumatism worse when the gastric symptoms were better, he effected a cure with K-bi. 6 and 3, after many other medicines had failed.—*M. Hom. Rev.*, March, 1873.

Dr. Kitchen and others have testified to its value in obstinate

vomiting in cases of gastric catarrhs and dyspepsia. I have found it also curative in a case of vomiting during unsuspected pregnancy, and Dr. Kitchen also reports in its favour in the vomiting of pregnancy. Also in the sequelæ of sea-sickness it will be found useful.

In round ulcer of the stomach it is one of the chief remedies in my experience, and also that of Hughes.

In a case of enlarged liver and dyspepsia, for which the patient had been three times at Karlsbad, I found it the chief remedy for pain at epigastrium in a small spot immediately after eating, want of taste and smell, tongue broad and flabby, costive.

Vulpian sums up the results of his empirical experience with this medicine in gastric and dyspeptic cases as follows: The cases of dyspepsia in which the bichromate has appeared to produce very good effects are those in which we might ask ourselves the question whether we had not to deal with neoplastic developments in the mucous membrane of the stomach. The patients had suffered for weeks or months, vomiting the food more or less completely, at times daily, at others every few days, in a digested form. The vomited matter only rarely showed a tinge which might be attributed to blood modified by the gastric juice. Vomiting was not always violent, nor always preceded by nausea. Anorexia not complete, and at times the appetite remained good. Some patients had no pain in the epigastrium, while in others it was more or less acute at intervals, which could not be referred to the times of taking food. In some there was tenderness to pressure in epigastrium and abdomen daily in the same spots, while in others there was none. The stomach was dilated in some cases, and in one there was a distinct painful tumour. Almost all the cases were markedly thin, pale, and in a pronounced state of debility, but without the characteristic complexion of the cancerous cachexia. Six cases are given in full detail, and as the results were such as to encourage us to persevere with the medicine in very serious disorders of the stomach, simulating, indeed, malignant disease, I may give an abstract of them:

Case I was sent into hospital as one of cancer of stomach; female aged 30; pale and thin; for a year vomiting of food and bile, with acute pains in stomach; at times brownish matters vomited; no appetite. Towards the right of the median line of the stomach a round tumour perceptible to touch and displaceable with the finger, about the size of a chestnut, painful on pressure. There were no signs of gall-stones, and the nature of this tumour remained doubtful. Inunction of K. hyd. and belladonna; and pills of 1 centigr. of bichromate 2 to 6 in the day taken after meals. Striking improvement in a month and cure in two months. Case II.—A man, aged 60. After vexations, impaired appetite and digestion. The partially digested food lay in the stomach four to seven days, and was then vomited easily in large quantity. Emaciation, paleness, debility, confining him to bed. Depressed expression, costiveness. No tumour nor pains in stomach, but uneasiness in l. hypochondr. Slight œdema of the legs, but no albumen in urine. Treatment four to nine pills of 1 centig. of bichromate daily, taken after meals. In a week, cessation of vomiting, and then gradual improvement, so that he was able for full work in eight weeks. This was most probably chronic gastric catarrh with paresis of the nerve extremities and muscular coat of the stomach. Case III, a woman of sixty. For three months, indigestion, vomiting, &c. She was emaciated, complexion cachectic: anorexia; daily vomiting some hours after meals; palpation of the epigastric region showed an extensive thickening (*empâtement*), but not a circumscribed tumour nor well-defined induration. Deep pressure elicited pain at

epigastrium; constant uneasiness there, which three or four times a day increased to pain, radiating towards left hypochondrium. This pain often hindered sleep. She never had jaundice nor signs of gall-stones. Treatment: inunctions of K. hyd. and belladonna, and pills of 1 centig. of bichromate, three to nine a day. Speedy and progressive improvement. This patient had been admitted as a case of cancer of the stomach, and in consequence applied for admission as incurable into the Salpetrière on the first vacancy. The result of course falsified that diagnosis, but there was evidently a very grave affection of the stomach analogous in some respects to the states which accompany cancer. Vulpian says he has had several similar cases cured by the bichromate, and in the following case of true cancer the accompanying dyspeptic symptoms were much relieved: CASE IV.—A woman, aged 66, had had for above three months anorexia, emaciation, and risings in the throat, repugnance to animal food, numbness in the back; debility, so that for the last month she is confined to bed; vomiting of mucus and bile, burning in pharynx and epigaster; vomiting after all food; pains in the back so aggravated by the vomiting as to extort cries; pale, yellow face; palpation showed a hard tumour in the epigastrium slightly painful on pressure, seated towards the right of the median line near the lower border of the false ribs. Treatment, the same ointment of K. hyd. and belladonna and two pills of 2 centigr. of bichromate daily, increased in a few days to four pills daily. The vomiting soon begun to diminish and ceased in nine days, and at the end of a month she was well enough to go to a convalescent institution. The tumour was smaller and gave little pain. Vulpian failed to induce the patient to stay under treatment longer, and he does not think the case cured, but that it is much to be able to ameliorate such a case so far. His next Case, V, was a further advanced case of cancer of the stomach, which afterwards left the hospital apparently to die, but a remarkable improvement took place and continued for some time under the bichromate three to six pills of 1 centigramme in the day. It is unnecessary to transcribe the details. Vulpian does not believe the medicine can cure developed cancer, but if given early it may retard the progressive development of the neoplasm, while it relieves or cures the accompanying morbid states of the stomach.

ABDOMEN.

118. An hour after the dose he vomited six times, and at the last with much bruised pain at upper belly, ejected a dark brown excessively bitter matter, followed by thirst, but drinking the least excited the nausea again; solid food did not; dislike to water for several days. On the second and third he had often a contractive pain in abdomen, and on the second pappy stools followed by sensation as if little was passed. Next two days stool scanty and hard (*A.*, ⅓ *gr.* 1 *dose, the last of his series*). For many weeks after the proving, even in the finest weather, he had a sensitiveness of the abdomen to the least cold air, and on exposure to the slightest draught he felt the tearing and constrictive feel in the abdomen. The stools were hard; painful retraction of anus on the days when there was no stool.

119. Much flatus for the first three days, no stool on the fourth, and a hard, difficult, and scanty stool on the fifth. Tongue yellowish-white, pappy taste, morning; complexion sallow and sickly; general feeling of discomfort and irritability. Sleepiness early in the evening (*Mz.*, 2*nd trit.* 1 *dose daily for five days*). [A similar group of symptoms was common to several provers.]

120. After breakfast first day was seized with violent pinching pains in the upper and middle of abdomen, with anxiety and sweat of the forehead. They gradually diminished and went off in two hours and

a half. Next day some rumbling and uneasiness at the navel, and no more colic. Only on the fifth towards evening a copious pappy stool, otherwise the stool was normal. On first, in the afternoon a sudden flush of heat on the face; again on second and fourth, and seventh and eighth. On the second he was disproportionately depressed and grieved with a small vexation (*Schl., ½ gr. before breakfast daily for five days*).

121. A slight oppressive pain at navel, and in a few hours soreness at right hypochondriac region, coming and going off at intervals during the day, second day. On the third day (evening) fulness and heaviness of the whole head, particularly the vertex, and general throbbing in it on bending forwards, and increase of appetite and thirst (*M. J., 1st dil. for three days*).

122. Urine red. Periodic constipation occurring every three months (*Gall. Ch. W.*).

123. Frequent throbbing headache at the angles of the forehead, in a small spot, accompanied with dimness of sight. Tongue dry and thickly coated in the morning, with nauseous taste in the mouth. Eyes swelled up and heavy in the morning. Shortness of breath, as if something were tied round the upper belly, so that he cannot take a deep breath; equal in all positions and circumstances, without cough or pain in the chest. Generally costive (*Slt., a workman, aged thirty-six*). [The above symptoms had lasted for months.]

124. Habitual constipation is common among the chrome workmen.

125. In the beginning of summer, for several successive years since employed at the works, has had dysenteric attacks lasting about three weeks; frequent bloody motions with gnawing pain at the navel, followed by ineffectual straining; tongue smooth, red, and cracked (*Slt., a workman, aged thirty-five*).

126. Dysenteric attacks, with pain at the navel and bloody evacuations (*Sm. Ch. W.*).

127. Fifth day.—Hawking of mucus and roughness in throat in the morning. Seventh.—Has a peculiar feel in the whole body, as of an acrid humour or diathesis, or the psora had been stirred up in him and caused all the symptoms. On the twenty-first hard stool, and on the twenty-second hard scanty stool, followed by burning at anus. On the twenty-third nausea, want of appetite for breakfast, and after it rumbling in belly and distension of abdomen; slight pressive pain at region of heart; distension after meals; tongue white, thick-coated, but good appetite and taste for food; humming in the head. Twenty-fourth, two rather hard stools. Twenty-fifth, in the morning slight griping in the bowels, followed by a semifluid stool with much rumbling. Breakfast with little appetite, and after it constant rumbling and searching and slight griping, then a second quite fluid stool, followed by retraction of the anus and slight nausea. After breakfast such a disagreeable, sharp-sweet metallic, resinous taste came at the throat that almost vomited. A third stool very scanty and fluid, but with relief to the uneasiness in abdomen. Later in the forenoon burning in the whole skin of head and face without redness, then again desire to stool, but only flatus passed; during the effort suddenly sweat

burst out all over, but especially on the face; soon went off, and he ate dinner with good appetite (*Zl.*, $\frac{1}{10}$ *gr. every four days for eight weeks*).

128. On the second day, soon after taking the medicine, he had eructations and great nausea, which lasted for a short time; the nausea came on again the fourth and ninth day, lasting for a short time, and on the tenth and eleventh day towards noon, as also on the evening of the eleventh day, with inclination to vomit, which lasted an hour and a half; nausea on smoking; at the same time a dull pressive pain appeared in the region of the three last true ribs of both sides, aggravated by deep breathing. On the twelfth day (without medicine) the same pain appeared, together with the nausea, which disappeared gradually towards noon, but reappeared the next day in a much less degree. After dinner he had a violent pressive headache, especially in the forehead, also a drawing, tensive, dull pain in the region of the nipple of the right side, aggravated by deep breathing and going upstairs, continuing till night. In walking sudden transient stitches in liver, making him stop; soon after wrenching in right knee. On the twelfth day he had a tearing pain in the right shoulder, and later in the day in the left elbow and forearm, which soon passed away (*Lack.*, 2 *gr. 1st trit. one dose daily for ten days*).

129. Eructations on the first of food, second and third like rancid bacon. Slight circumscribed pain in left hypochondrium on first, boring ditto on third, and also dull pain in hepatic region, increased on full inspiration, and cough; the latter again next day. On the second darting pain in præcordium. On fourth day pressive pain in groin, as if an abscess were about to form. On the fifth shooting in the liver and dull aching in it posteriorly. Transitory darting pain in the forehead, and after a fresh dose obtuse heavy pain above the eyes and occasionally in the temple, aggravated by the open air, with the nausea and burning at the pharynx on first day; and second and fourth days pressive darting pains in both temples, vertigo on moving the head rapidly, lasting hours. Third day slight shooting in forehead, and pulsative pain in parietal bone. Fifth, shooting across forehead and temples while walking, relieved by rest. Heartburn and slight transitory pain in the middle of the lung woke him in the night. A fixed burning pain in middle of sternum, dull circumscribed pain in right chest, aggravated by inspiration; on the second day and fourth constant pain in chest under left axilla. On rising in the morning, second day, taste of blood in the mouth, and again in the evening, and again on seventh. Imaginary putrid smells on the second. Disinclination for exertion on second; drowsiness and yawning after dinner on fourth. In sleep frequent startings, tossing about the arms, incoherent talking, and finally snoring on second. Copious dark-coloured evacuation with tenesmus on the fifth. Swelling of stomach in the evening, with fulness and pain on pressure; cannot bear tight clothes on the sixth. Next day feeling of sinking in stomach before breakfast (*Dgn.*, $1\frac{1}{2}$ *to* $2\frac{1}{2}$ *gr. daily for two days*).

130. Nausea and a resinous bitter taste after breakfast and dinner, and after smoking; tongue yellow coated; little appetite; sallow com-

plexion. On the second, towards noon, a sudden spasmodic contraction of the intestines with nausea, which lasted about a quarter of an hour, and was then followed by a pappy stool with burning in the anus and straining: after this all the symptoms disappeared, but returned at four and ten, lasting for a short time, but without the stool. Violent pressing headache on the top of the head, spreading to the sides of the head and temples, in the afternoon. On the third, oppression and a stitch in the lower part of the chest on deep inspiration. On the fourth, in the evening, a stitch for a short time in the region of the heart. Irritability and querulous disposition. On the fourth, urine muddy and with copious sediment in the morning (*Three male provers, one dose of* 1*st trit. once daily for six to eight days*).

130*a*. At times violent gripes, and especially spasmodic contractions in the upper belly. Desire to stool with nausea and watering of the mouth, burning at anus and erections (*Lack.*, 2*nd trit.*).

130*b*. Nausea aggravated by slight pressure on stomach and liver, which are painful; griping and rumbling in belly, and an indescribable feeling of straining and pressure at anus as if diarrhœa would come, but all symptoms suddenly went off after discharge of flatus (*Mz.*, 1*st trit.*).

131. On the twenty-eighth day, pressing pain in a small spot in the bowels to the right of the navel. Normal stool. Pressure in a small spot in the upper lobe of right lung, which changed into a drawing pain in the whole length of the right lung, and went off after sitting half an hour; thereupon he had a strong pressure at the anus. This gave place to pressure in stomach and upper belly. He feels altogether very ill without being able to ascribe it to any distinct symptoms (*Zl.*, $\frac{1}{10}$*th gr. every four days for eight weeks*).

131*a*. He awoke at 5 a.m. with a feeling of weakness round the navel as if he had taken a purgative, with pressive aching in head (*M. J.*, 1*st dil.* 2*nd day*).

132. Soon after the usual eructation, nausea, confusion in head, and flow of saliva. First day in the afternoon, violent stitches in the left hypochondrium, spreading to the loins, worse on motion and pressure, with some inclination to cough, and thick white expectoration. Towards evening, a stool, at the first consistent and then diarrhœal, and an hour after violent shooting in the region of the liver, increased by slight pressure; quarter of an hour afterwards, cutting and griping in abdomen, as if diarrhœa were coming on, and soreness of the whole belly to rough touching. The whole attack went off in about ten minutes, and left the abdomen painless to strong pressure. There remained ill-humour and indescribable discomfort. Next day, a solid stool, followed in an hour by a fluid one; headache; frequent short attacks of nausea and colic, soon going off. Third day, repeated troublesome colicky attacks. On the mornings of the second and third, giddiness on sitting up in bed, as if everything turned round; on suddenly lying back again it was increased and nausea came on: it lasted a quarter of an hour (*Mz.*, $\frac{1}{5}$*th gr., one dose*).

132*a*. After stool uneasiness and distension of abdomen (*Zl.*, 1*st trit.*).

132*b*. Mild cutting pains, which seemed more in the peritoneum than the bowels, for about half an hour (*Zl.*, *1st trit.*)

133. No symptoms first day. Next morning she wakened at 6 a.m. with hurried desire to stool, and the watery contents gushed out; after it violent colicky straining, so that she could not get up; after this burning in the whole belly, and great nausea and retching. Felt weak and ill the whole day after (*K. K.*, *a female*, *one dose 1st trit.*)

134. Pale slate-coloured stools. Shooting through bowels. *K.*, $\frac{1}{20}$ *gtt. 1st dil. daily for ten days*).

134*a*. Severe pain in abdomen, followed by blackish watery stool (*Tnr.*, *1st dil.*).

135. Frequently, on different days, short stinging and pricking pains in the tongue. Shooting pains generally in one temple. Pains darting or aching in one side of the head. Flying pains about the head. Sensation of a fœtid smell. On the third and seventh, tearing shooting pains in the right hypochondrium, of short duration. Fifth, sensation as if the food remained in the œsophagus. Scanty urine with white film and whitish deposit. Sixth, in the evening, weariness, distension of the abdomen, hiccup and waterbrash; and at night, deep seated dull shooting pains under the scapulæ; vivid dreams, and he awoke early, and then fell into a confused heavy half sleep; in the morning unrefreshed and weary. On the seventh, transient heavy pains in the right temple immediately after eating; frequently recurring in the afternoon, accompanied by an uneasy craving sensation in the stomach. Eighth, after dinner, external stitches in the epigastrium and breast into the nipple (male), and in the right hypochondrium: dull pressive pain in the right side of the spine about the ninth dorsal vertebra, with uneasiness in the stomach. From the tenth day till some days after leaving off the proving, he had aching at the right hypochondrium; scanty, pale, clay-coloured stools, sometimes twice a day; metallic taste, fœtid breath, and confusion in the head. In the second week, nausea, relieved by eating. Frequent fine irregular stitches in the integuments of the chest, unconnected with respiration or palpitation. Sharp irritative fixed pain in the region of apex of heart, unaffected by respiration or position. In the second week the appetite was increased, being better than at the beginning of the proving, and the gastric symptoms were relieved after eating in general, while the rheumatic symptoms (distant pains, &c.) re-appeared (*Dle.*, *from 5 to 60 gtt. 1st dil. several times a day for fourteen days*).

136. For the first two or three days no stool, or scanty and hard stools. For the first ten days or fortnight much distension of the abdomen and rumbling of pent-up flatus. Appetite bad, and resinous bitter taste after meals. In the third and fourth weeks, frequently two semi-fluid stools, not copious, one often on rising in the morning. Throughout, appetite bad for breakfast and often nausea during or after it, and bad taste. On the third the nausea after breakfast was accompanied by a paralytic tearing pain in the shoulder. Throughout, every day or two an aching or burning pressive pain in the stomach

at various times, and in the first week several times towards evening a pressing pain at the heart, with a peculiar uneasy sensation. In the first week, several days an uncomfortable feeling of pressure in the back between the scapulæ, recurring several times in the day. In the second week, several times a dull stitch in the right side at the edge of the thorax in the region of the liver, not affected by motion or deep inspiration. Incarceration of flatulence in the stomach and whole lower part of chest. Pressive pain at heart for some hours after dinner. In the eighth and eleventh, turbid urine in the afternoon and depositing a thick mucous sediment. In the fourth week, for several days dryness of the mouth and lips, and after breakfast on the twenty-sixth some itching and burning vesicles break out on the margin of the lips: better next day. At different times pressure on the top of the head, and on the twenty-second had on waking pretty severe headache, especially at the top, disappeared on rising but left languor behind: it returned in the afternoon. In the evening the feeling as if all the bones of the head would fly asunder, by the pressure of the too large brain; this feeling cannot exactly be called pain, but is very oppressive, and is felt most on the temples towards the ears and on the parietal bone. External meatus sensitive and feels closed (*Three male provers, 2nd trit. one dose daily, twenty to twenty-seven days*).

137. For the first two days he had nausea and emptiness, little appetite, and confined bowels. On the third complete loss of appetite, constant thirst and yellow-coated tongue, and no stool. Very severe headache, sometimes in the morning about three or four hours after the dose; sometimes in the evening pressing tearing pain through the whole head, especially severe in the forehead and occiput, with stitches constantly recurring in the same spot in the temples. The headache unusually severe on the third evening, as if a knife were cutting through the head, with quickened pulse. After going to bed he had palpitation, with dull burdensome pain in region of heart. Sleep good. On the first, along with the headache, copious flow of tears from both eyes, with fleeting stitches in the eyelids, the conjunctiva of the eyelids more reddened than usual, in conjunctiva of eyeball several red injected vessels. Fourth day a hard stool in the evening. Fifth, half an hour after a moderate dinner sudden nausea, uncomfortable feelings of pressure in stomach, stabbing pinching pain in region of liver, forcible call to vomit, rumbling in the belly, passage of fœtid flatus, violent griping in the whole abdomen, cutting as by knives in all directions in the belly; after a stool of usual consistence and colour, a dysenteric diarrhœa of brown frothy water, with violent painful pressure, kneading, and tenesmus in the anus. After seven or eight similar loose stools, accompanied by constant pain in the belly, nausea and inclination to vomit, complete quiet suddenly followed, and except a bitter pappy taste and whitish yellow coated tongue no symptoms remained; the universal disturbance in the belly, which had lasted scarce an hour, was appeased. Seventh, general emaciation is apparent, yellow complexion, no stool. Irri-

tability and indisposition to mental effort (*Mz.*, 8 *gr. 1st trit. one dose daily, eleven days*).

137*a*. One prover had, at noon, an aching at the anus which after sitting increased to the sensation of a plug, and became so painful that he could scarcely sit. On the same, and the preceding and following days he had fulness and pressure in the hæmorrhoidal vessels, soreness and itching at anus, straining at anus after stool; pressure and straining and urging at anus, which increases at times to a severe pain. During dinner such pain at anus that he could scarcely sit. There was also the usual furred tongue, want of appetite, tearing in stomach, rumbling and distension of abdomen, especially after meals (*Zl.*, *1st. trit.*).

137*b*. After about 40 gr. in solution, nausea and vomiting for eight hours, and prostration; purging; scanty urine. Then for long remained: loaded tongue, bad taste, strong feeling of bearing down towards the right groin; a very tender point midway between umbilicus and spine of right ilium, evidently the ascending colon, which frequently bulges out (nine months after). Wakens with an uneasy feeling in right iliac region (*toxic case*, *B. J. Hom.*, ii, 139).

137*c*. Severe abdominal pains; slightly purged, the evacuation being of a greenish yellow colour; quite prostrate (*toxic case*, *Allen*).

137*d*. In half an hour quite prostrate; constant diarrhœa, and the evacuations passed involuntarily; the bed was perfectly swamped; cramp in the region of the heart; pulse small and exceedingly depressed, so much so that I felt alarmed at his state; cramp in legs and thighs (*toxic case, a teaspoonful of solution*, *Wickens*, *Allen*).

137*e*. Severe retchings and vomiting; abdominal pains (*toxic case*, *Ogston's*, *Allen*).

137*f*. Vomiting; all mucilaginous liquids were immediately rejected; severe pain in the stomach; abdomen inflated and sensitive to the lightest pressure; colic; stools bloody and extremely painful (*toxic case with dust of the drug swallowed*, *Dusterburg's*, *Allen*).

Pathological Anatomy.

In man, see 95 and 171. In animals, the duodenum was even more constantly acted on than the stomach; the injection began immediately beyond the pylorus, and varied from slight redness or detached red spots and stripes to intense inflammation and even ulceration. In Case 15 the same deep injection began immediately after the pylorus, and extended along the whole duodenum in equal intensity; in the jejunum it became gradually lighter, and ceased about the beginning of the ileum; the rest of the intestinal tube was healthy, except the rectum, which was deeply injected. In 16 the duodenum presented numerous vascular streaks, and scattered over it through its whole extent numerous oval ulcers from one eighth to one inch long. In 18 the mucous membrane of the duodenum was highly injected, plum-coloured and thickened, containing numerous very regular ulcers of an oval shape with sharply defined edges, the mucous membrane completely eaten out. The injection and ulcerations extended throughout the jejunum. The ulcers varied from a quarter of an inch to an inch in long diameter. Viscid purple mucus in duodenum and jejunum; spots of extravasated blood in duodenum.

Ileum to Rectum.—Throughout the small intestines (Case 16) were numerous injected patches. There was a recent intussusception of the ileum in 16 and 18. In 18, 23, and several others, the colour and injection gradually died away, and were

entirely absent in the colon and rectum. In 23 and 24 the mucous membrane of the cœcal valve was reddened, and had blackish spots on it. In 22 the colon and rectum were deeply reddened; and in 16 there were longitudinal bright red patches in the rectum, apparently the result of inflammation, and several spots of extravasated blood. Contents—In general neither food nor fæces were found in the stomach and intestinal canal; but they were lined with a tough reddish mucus. The mucous membrane of the ileum reddened and injected. In exp. 26, the outer surface of the ileum strongly reddened with gelatinous mucus inside; red spots in the cæcum. In exp. 25 the rectum was constricted in three places, and distended with gas at the intervals. Rectum injected and with long patches of redness and some ecchymosed spots. The vessels of the mesentery and mesocolon injected, and the glands in exp. 26 thickened and enlarged, and containing a brown friable substance. In 26, 27, and 28 the diaphragm was reddened and traversed by enlarged vessels.

Liver.—In 29 and 39 dark brown, very friable, and full of blood. In most, the gall-bladder was full of bile. In 17 the surface presented the appearance of alternate very dark and pale patches The section had a mottled appearance. Scattered over both surfaces were numerous spots of a whitish yellow colour about the size of a pea, slightly depressed, and of a softer consistence than the surrounding structure. When cut into they were found to extend into the substance of the gland in a globular form. In 18 both surfaces of the liver were studded with yellowish spots of a spherical shape, the size of large peas, reaching from one quarter to half an inch into the substance of the gland. Where they touch the surface there is a slight depression or indentation showing a loss of substance. They are of a softer consistence than the surrounding parenchyma. In all cases of chronic poisoning the liver was enlarged, and in some even to twice its natural size: full of blood, soft, friable, and dark reddish brown or blackish; gall-bladder full of bile. In Vulpian's cases, yellow patches in liver like those after phosphorus poisoning, and at those parts the microscope showed fatty granulations.

Abdomen (local symptoms 118 *to* 137*b*).

Distension 92^{27} (im. eff.), 106, 109^{22}, 136^{2}, 111^{28}, 127^{7}.
— in the evening, 129^{24}, 135^{7}, 137*a*, 137*f*.
Flatulence, 106, 107, 119.
— incarceration of, 136^{16}.
— fetid, 137^{18}.
Rumbling, 81, 92^{27} (im. eff.), 111^{28}, 120, 127^{7}, 136^{8}, 137^{17}, 137*a*.
Abdomen sensitive, 109^{22}, 132, 137*f*.
— to the least pressure, 96^{23}, (gastro-enteritis), 137*f*.
— to the least draught of cold air, 118.
Cannot bear tight clothes, 129^{28}.
Swollen and tender, 96^{36} (dysentery).
Tenderness at sigmoid flexure, 96^{43} (dysentery).
Weakness, 131*a*.

Pains.

Severe, 137*c*.
Burning, 133.
Boring, 129^{2}.
Griping and colic, 132^{8}.
Piercing, 113.
Stitch, 204^{22}.
Shootings, 134, 105.
Contractive, and spasms, 118, 130, 130*a*.
Bruise pain, 118, 181.
Sore, 137*b*.
Pinching in the upper belly, 120.
— violent, with sweat on forehead, 120.
Griping, 81, 85 (im. eff.), 93, 111^{28}, 113, 114 (gastr.), 132^{7}, 137^{18}.
— as if to diarrhœa, 131*a*, 132^{6}.
A transient stitch through abdomen backwards, 204^{22}.
Pain in a small spot, 109^{16}, 131.

Conditions of Pains.

Pressure, 132^{3}.
Motion, 132^{3}.
Sitting, 137*a*.
Passing flatus, better by, 130*b*.
Awaking (r. iliac), 137*b*.
Breathing 129^{2}.
Coughing, 129^{4}.

Concomitants of Pains.

Nausea, 132^{13}, 133.
Sweat in forehead, 120.
Diarrhœa, 137^{24}.

Succession of Symptoms.

Pinching alternately with cramp at the stomach, 114.
Spasmodic contraction in guts, followed by loose stools, 130.
Pain in lung, then anus, then upper belly, 131.
After loose stool, burning in belly and nausea, 133.
— feeling as if little was passed, 118.

After diarrhœa, bitter taste and yellow tongue, 137[25].
Stitches in liver followed by pain in knee, 128[14].
Pressure at anus followed by pain at stomach, 131.

LOCALITY.

Right Hypochondrium.

Aching, 11 (head), 121, 135[17], 137[17], 129[3].
Stitches, 104, 128[14], 129[7], 132[6], 135[5], 136[14], 137[16].
Pain worse on respiration and cough, 129[3].
Soreness, 121.
Dull stitch not affected by motion or deep inspiration, 136[14].
Aching in liver posteriorly, 129[7].

Left Hypochondrium.

Shooting, 4 (vertigo), 132[3], 132[6].
— up to the chest, clavicle, and neck, 110.
Dull pain, 129[2].
Boring, 129[2].
Shooting to loins, 132[3].

Both.

Dull pain in both hypochondria, in region of three last true ribs, with nausea, 128[7], 129[3].

Up belly, 131, 120.
— bruise-pain, 118.
— darting, 129[5].
— spasms, 130*a*.
Pains, at the navel, 120, 121, 125, 126, 131.
— from navel to throat, 9 (headache, &c.).
— in a small spot above navel, 109[17].
— right of navel, 131.
— feeling of weakness at navel, 131*a*.

Iliac regions.

Uneasiness, right, 137*b*.
Bulging out, right, 137*b*.
Bearing down to r. groin, 137*b*.
Pain as of an abscess, 129[6].
Between umb. and r. iliac region, sore place, 137*b*.
Shooting in l. loin and iliac region, 105.
Soreness in r. groin and hip joint, 181.

Colon.

Bulging of ascending, 137*b*.
Symphisis pubis, 101.
Peritonæum, 132*b*.

Anus.

Pain that he could not sit, 137*a*.
Feeling of plug, 137*a*.
Pressure and burning, 26*b*, 130.
Painful retraction, 118.
— after loose stool, 127[14].
Burning and erections, 130*a*.
Itching at rectum, 97, 137*a*.
Straining, 125 (dysentery), 129[24], 137[22], 130*b*, 137*a*, 96[33] (dysentery).
— empty, with sweat all over, 127[19].
Fulness in hæmorrhoidal vessels, 111[11], 137*a*.

Stool.

Urging and desire to stool, 130*b*.
— after meals, 117.
Before stool—
pain in abdomen, 134*a*.
During—
colic and nausea 137[21] (diarrhœa).
burning and straining, 130 (loose).
very painful, 137*f*.
After—
nausea, 127[14].
uneasiness and distension, 132*a*.
straining at anus, 137*a*.
„ and colic, 133, 137[21].
burning, 127[5] (hard).
Periodic constipation, 122.
Constipation, disposition to, 65, 106, 123, 124, 159, 160[14], 169 (pain in back).
Constipation with pain across loins, 169.
— general aggravation, 106.
— retraction of anus, 118.
No stool for two days or more, 119, 136[1], 137.
Hard or knotty stool, 109[21], 111[27], 118, 119, 127[19], 136[1], 137[14].
Semi-fluid stools, 111[26], 118, 120, 127[11], 130, 135[19].
— two daily, 135[19], 136[4].
— three, 127[11].
Watery, 133.
Dark-coloured stool, 129[23], 134*a*.
Dark watery stool preceded by pain in abdomen, 134*a*.
First consistent, then loose, 132[5].
— stool then a loose one, 127[11], 132[3].
Pale slate-coloured stools, 134, 135[19].
Bloody motions, 125, 126, 137*f*.
Dysenteric attacks, 126, 125, 137*f*.
Incessant purging, 137*b*, 137*d* (involuntary).
— of mucus and blood passed in bed, 96[32] (dysentery).
Diarrhœa, 137[20].
— early in the morning, 133, 136[5].

Commentary.

The morbid state from the duodenum to the rectum is sufficiently indicated by the pathological anatomy. We see there and in the symptoms muco-enteritis in all degrees from slight up to violent or fatal with fever, tenderness of abdomen, and incessant bloody stools. The resulting chronic effects in cases not fatal are seen in SS. 96, 137*b*, and others, thus affording valuable indications for the treatment of those often intractable cases. The marked elective affinity of the drug for the duodenum promises much usefulness in the form of indigestion and hepatic disorder depending on chronic disorders in those parts, and the ulceration reminds us of the similar state induced by large burns. In toxic doses true mucous enteritis is produced, with incessant purging, distension, and extreme tenderness of abdomen, cramps in the legs, and high fever. At other times dysentery is produced. In the less intense effects of the provings we have represented the incipient stages of these diseases and a great variety of the morbid states comprehended under catarrh of the bowels, both acute and chronic, such as constipation, colic, flatulence, &c. Also sensitiveness to cold was a marked feature and ought to form an indication for therapeutical use, and connected with the state of the mesenteric glands noted in the pathological anatomy we may notice the emaciation of the animals, and the anæmic and cachectic state of some of the workmen and provers. The action on the liver is well marked in the experiments, going on to abscesses. But it is difficult to connect that with the morbid states in man and apply it to practice, as inflammation running to abscess is very rare in this country. There must be several important changes in the liver affecting the secretion, as pale stools is a primary symptom without jaundice, in this resembling chelidonium. Analogous medicines: Sensitiveness to cold air aln., am-c., mer., pho.; colic with anxiety spi., su.x.; bloody motions with pain at navel, ars., cap., gam.; boring in l. hypoch. na-m.; hepatic pain on inspiration arn., coc., mer.; pain in a small spot, K.-ca., lyc., plb., rhs., teu., zin.

Therapeutics.

In acute and chronic catarrhal inflammation of the duodenum we have repeated evidence of its utility when given according to the symptoms, and many of these cases of acute spasmodic pains in the right hypochondrium simulating gall-stones yield to it. In other cases of pain in the right hypochondrium, the pathology of which is not obvious, we have cures, *e.g.*:

CASE 27.—A man, aged 32, who had suffered for three years from pain in the right side, came to the dispensary. The pain was in a small spot in the right hypochondrium; pretty constant, but aggravated to a sharp stitch on sudden motion after sitting; his appetite was good and his health not much affected, but the pain was so severe and troublesome that he had been to various medical men seeking relief in vain. Bry., nux, and other medicines were given without result. K. bich. 6 was then given with speedy relief, and effected a permanent cure in a few weeks.

The liver is no doubt affected in many of the above cases, and in numerous cases of bilious and flatulent colics for which K-bi. has been the sole, or one of the remedies. As acute suppurative disease of the liver hardly occurs in this country, I have no experience to report, but am surprised that our Indian colleagues have not furnished any.

In chronic catarrh of the mucous membrane of the bowels, with flatulent colic and constipation, this remedy has often found a place. Also I have seen several cases of sensitiveness to cold in the bowels with colicky attacks, after slight exposure to cold, removed by our remedy in accordance with sympt. 118. Hughes reports one of a gentleman who had been liable for years to irritability of the stomach and abdomen to cold, which brought on attacks of colic and intestinal catarrh. It has also been found of striking benefit in chronic entero-colitis, and even ulceration of the mucous membrane or the glands therein. Two cases are given by Dr. Hilbers in which there was diarrhœa with extreme pain and general wasting. I have also had similar cases where it was ultimately curative, in particular one of a middle-aged man with chronic colitis with raw-beef tongue and frequent loose stools, and others in which much mitigation of the disease was effected, though not ultimate cure. Hughes also confirms this indication.

In several cases of chronic whitish diarrhœa and hepatic derangement of children, I have obtained very satisfactory results with this medicine as the basis of the treatment.

Case 34.—A boy, aged 4, of sanguine temperament, had for some time been subject to a chronic diarrhœa, for which a variety of homœopathic medicines were tried with partial or temporary benefit. His appetite and general health appear pretty good., but the bowels are disordered—several thin motions daily, clayey and offensive. Before stool he looks pale and shivering, and during it has uneasiness and paleness. Frequent thirst. K. bich. 6 and 3, a dose every alternate night, removed the disease in a fortnight.

Dr. Kitchen found it of great benefit in cases of frequent, watery, burning diarrhœa, yellowish or light brown, with little or no pain or smell, coming away suddenly and frequently without control. He gives cases viz.: "A lady used to pass watery, sudden, uncontrollable stools in bed and was cured by a few doses of the 1st dilution: a gentleman of eighty-five was cured of the same, and the discharge often occurred in riding in a carriage." A case also was wonderfully relieved, of vomiting and diarrhœa after midnight, with sore, blistered tongue.

In cholera infantum Kitchen finds it changes the profuse watery green stools to a more consistent and healthy condition.

I regret that I have no similar case to add to the following from the previous edition. Nor do I find much to record of the action of our drug in ordinary dysentery, although it promises so well, and I hope that our colleagues in warm climates will keep it more in mind than hitherto.

Case 36.—*Dysentery after a large burn.*—A boy of stout make and large head, about 8 years old, accidentally set fire to his clothes, whereby he sustained a severe burn, causing an extensive slough of the skin all over one hip and thigh and down the leg. From the time of receiving the injury he had frequently complained of pains in the abdomen of a more or less transitory character; but four weeks after, he had

diarrhœa and febrile irritation, and frequent pains in the bowels; in three or four days more the evacuations became bloody and very frequent, and the pains incessant. This state had lasted three days (opiates, &c., and latterly acetate of lead and opium had been ordered) in the hands of two eminent and skilful practitioners, who pronounced the case to be one of ulceration of the bowels, and had given a very bad prognosis when the parents requested me to prescribe. They were quite in despair, and naturally in great distress, for it was their only child. On the 24th October, in the evening, I found him suffering from constant pain in the abdomen, so that his mother has to be rubbing it gently without ceasing; he is fretful; much emaciated; intolerant of light; pulse 120. He has very frequent evacuations of mucus and blood, preceded by violent pain in the abdomen, but not followed by much tenesmus. The tongue is pointed and red like a piece of raw beef; there is little thirst and no appetite. He has scarcely any sleep for the pain, which causes him to awake screaming after a very short sleep. Ars. 6 every four hours. In thirty-six hours he was considerably improved, and there had been some feculent appearance in some of the motions, but still the main symptoms continued and the pain was very severe. He had also feverish paroxysms towards evening; slight nausea; some watery eructations; sudden starts and screams on waking. I now gave K. bich. 4, every six hours. On the 28th he was very much improved, in fact convalescing very rapidly. He had slept three hours at a time; had had no stool for twelve hours; but still the last evacuation contained mucus and bright red blood, though the one before was feculent. He had a great appetite and scarcely any pain in abdomen. Cont. med.

1st Nov.—By the 29th the motions had become quite free from blood and natural in appearance, and were since costive. The dysentery was now quite well, and he got nux and afterwards puls. for some other symptom of little moment, and finally made a good recovery.

In this case the action of the K. bich. was much more marked and beneficial than that of the ars., and if it had been given sooner would, I doubt not, have effected the cure alone.

Whether this was a case of ordinary dysentery, or ought to be looked on as colitis or entero-colitis, and how far it may be connected with the lesion of the mucous membrane, which most frequently accompanies large burns, it is difficult to say, but it suggests the reflection that our remedy is likely to be indicated in those secondary effects of burns. On this subject Mr. Long, of Liverpool, has published (in the *London Med. Gazette*, Feb. 7, 1840) some interesting cases, and among them two in which death was caused by a perforating ulcer of the duodenum. Mr. T. B. Curling has republished these, with some additional cases and some interesting remarks in the twenty-fifth vol. of the *Medico-Chirurgical Transactions*. From these it appears that after burns, by far the most frequent secondary lesion is inflammation of the duodenum, more especially of Brunner's glands, sometimes followed by perforating ulcer, which is the common cause of the sudden death at-times observed in cases of severe burns which appear otherwise to be doing well. From the specific effect of the K. bich. on the intestinal mucous membrane, and especially the duodenum, when introduced even through a wound, we may expect to find it a useful remedy in the secondary effects of burns on the intestinal tube.

Bladder and Urine and Genitals.

138. On the second and eighth slight pricking pain in glans penis, and occasional smarting during micturition, lasting two days. Next day high-coloured urine and heat in passing it (*Dgn. s. d.*).

139. On waking in the morning a constrictive pain at the root of the penis. Seventh day.—While urinating, and long after, a burning pain was felt in the glandular portion of the urethra (*Lack., 1st dil. fourteen days*).

140. Painful drawing from the perinæum into the urethra (*Zl., 1st trit. three days*).

141. On the fourteenth day, in the afternoon, he had several times shooting pains in the prostate, extremely severe, and preventing his walking (*Lack., fourteen days, 1st dil.*).

142. Irritation at the orifice of the meatus urinarius (male) (*N—n.*).

143. Several others had slight pricking or burning in urethra during or after micturition. Also specified in the bulb and the fossa navicularis.

143*a*. One female prover reports soreness of the vagina; another swelling of the genitals; another leucorrhœa, but further confirmation is required before we admit these as pathogenic effects of this drug.

Pathological Anatomy.

Human, see 171. In animals: *Kidneys.*—In Case 18 the tubuli were much injected, and the whole substance of these organs in a state of congestion. In No. 24 the tubular substance was somewhat softer than natural, and reddened; the bladder was full of clear watery urine. In No. 25 the kidneys were dense and firm; the cortical and tubular parts not to be distinguished by their colour, which was in both dark brownish red; the bladder was quite filled with thickish yellow puruleut looking urine; its coats soft, but without any traces of inflammation. In No. 26 the kidneys were outwardly dark coloured, and inwardly showed only slight traces of the tubular substance. In 27, when cut into, they showed a brownish red colour, so that no trace of the tubular substance was to be seen. No. 28 presented exactly the same appearances. In the three last cases the bladder was quite empty. In Case 33 the bladder and its immediate neighbourhood were reddened. In Priestley's and Gergen's cases the kidneys were congested with cherry-coloured blood; ecchymoses on cortex; cortical substance yellow and medullary dark red; dimness and fatty degeneration of epithelium. Parenchymatous desquamative nephritis, albuminous urine and casts of renal epithelium. Injection and ecchymoses of vesical mucous membrane.

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Commentary.

The specific influence on the bladder, urethra, and genitals is little marked, but that, on the other hand, on the kidneys is well seen, both in the experiments and in the toxic cases. The morbid state is parenchymatous desquamative nephritis, with scanty albuminous urine and renal epithelial casts, or with total suppression of urine. The sphere of therapeutic action is thus indicated and in the acute stage. In the suppression of urine in Asiatic cholera it is also indicated. In the experiments of Zlatarovich, which lasted from a month to ten weeks, the kidneys were in every case affected, and in general in a state of degeneration, with the tubular portion softened and reddened, and undistinguishable from the rest. The urine was also apparently suppressed or altered, for the bladder was either empty, as in most cases, or full of pus.

Connected with these changes we may also note the state of the brain and membranes, which were found injected, and in one case there was extravasation of blood. It is most likely these appearances were dependent on the state of the kidney, as in other experiments the medicine did not display any idiopathic action on that organ. It must be observed, however, also that in these cases there was great enlargement of the heart.

The symptoms in the provers do not show any primary functional disturbance of the urinary secretion, and that seems only modified in cases such as those of the workmen who are affected with signs of inflammatory irritation of the kidneys. I regret that I have not had the opportunity of examining chemically or microscopically the urine in such cases, as it would be interesting to know how far the degeneration of the kidney in question resembles that of Bright's disease.

The fatal case of pyelitis at 171*a* seems to me to have been owing to the toxic influence of this drug, and therefore will furnish a valuable indication for its therapeutic use.

Therapeutics.

The action on the urinary organs, all except the kidneys themselves, appears to be very slight. From the action on the kidney already described, we should expect to find it useful in congestion of those organs, and accordingly I have tried it in the suppression of urine of cholera, with the result described at p. 119 and 161 of vol. viii of the *British Journal of Homœopathy*. Although arsenic also pro-

duces suppression of urine—and doubtless this is one reason more for the great utility of that medicine in the Asiatic cholera—still we found in some cases the suppression continue after the use of arsenic, and therefore we used this medicine in twelve cases in the second trituration. Of these the urine returned in eleven, but the number of cases is still too small to form a positive opinion on its utility.

Experience in disease is still wanting with respect to the parenchymatous nephritis and the pyelitis in the proving. I have, however, frequently used it with success in cases similar to those here given, in which I was guided by the symptoms alone, and no more accurate diagnosis arrived at, nor any more complete analysis of the urine made. I regret that this section is still so incomplete.

CASE 38.—B. D., aged 50, had for three weeks a constant aching in the region of the kidneys, worse in the right side, where the pain was frequently shooting through to the bowels. There was also soreness at the stomach and acidity. The urine was high-coloured and scanty. K. bich. 3 ter. die. In ten days the urinary symptom and pain were gone, but the bowels were costive: Nux removed this.

CASE 39.—Mr. M., a gentleman aged about thirty, after being exposed to cold some months before, had pains in the loins, &c., which were attributed to the kidneys, and he was cupped, &c., but he still complained on the 23rd October of a dull, constant pain and feeling of pressure in the loins, worse early in the morning, when it wakes him, and he tosses about to find rest; the places are tender to pressure. Urine red, but not scanty; no difficulty in passing it; white tongue, Kal. bich. 3 ter. die. In a few days the pain was gone, and he awoke free from uneasiness, and the urine was clear.

In accordance with the pure symptoms, we have little or no therapeutic action to report on the genital organs. On theoretical grounds some have recommended it in viscid and stringy leucorrhœa, but the stringy mucous secretion was not observed in respect to the genito-urinary mucous membrane, and we have no right to conclude from the action on the respiratory mucous membrane that it would be curative here. A similar remark applies to membranous dysmenorrhœa. Here Dr. Hale, acting on that theory, tried it and found it useless, whereupon he remarks that that is what we might have expected, as the membrane is not croupous, but corresponds rather with the decidua vera. In this Ludlam also concurs.

RESPIRATORY ORGANS (*for Coryza see Nose*).

144. In the course of the tenth day took in all four drachms of the solution, equal to two grains, and on the eleventh awoke with all the feelings of having caught a severe cold, the nose full and loaded, as if going to discharge abundantly, the throat dry, with pain in swallowing; tongue thickly furred and of a light brown colour on the dorsum, soreness in the larynx, pain in the sides and nape of the neck and left shoulder, the throat looks red and inflamed around the tonsils. The cough began on awaking, the sputa free and thick, transparent, of a slaty colour. Cough with dense transparent sputa in small lumps easily detached. Slight dyspnœa, as if the mucous

membrane of the bronchi was thickened, on rising in the morning. Sensation of dryness in the bronchi on awaking in the morning (*Nn.*).

145. Ninth day.—In the morning frequent short, broken cough, till a few lumps of tough mucus were detached, and there remained some soreness at the larynx (*Zl.*, *2nd trit. twenty-three days*).

146. Sneezing in the morning and evening. On the first day tickling in the larynx, causing clearing of the throat, and at night tickling at the top of the larynx, causing considerable coughing on first lying down. Dull circumscribed pain in right side of chest, aggravated by inspiration. On the second day feeling of irritation in the larynx in the morning, causing to hawk up mucus. Insupportable tickling of larynx, causing cough at almost every inspiration; not much mucus ejected. On the third day the same in the morning, and later in the day cough causing pain in the middle of the sternum, painful to pressure, darting to between the shoulders, and also cough with expectoration of thick yellow mucus, with traces of blood. Next day soreness as if ulceration of the larynx, at dinner great tickling in larynx after the first few mouthfuls, going after eating more (*Dgn.*, *s. d. five days*).

147. On the first day towards noon, occasional tickling in the larynx and constant hoarseness of voice, which reappeared with increased intensity on the succeeding days, lasting till evening, when it was generally the worst. The tickling in the larynx was generally present, with hawking or coughing up of thick phlegm, gradually subsiding. On the sixth night he suffered from much tightness of the chest, especially at the bifurcation of the trachea, obliging him to breathe deeply (*Lack.*, *1st trit. 1 dose daily for two days*).

148. On the seventh day collection of mucus in the larynx, obliging him to hawk it up; towards noon dry tickling cough came on, with shootings in the chest. On the tenth day sudden hoarseness in the evening, and on the following day there was frequent hawking up in the morning of thick, tough, yellowish-whitish mucus, contained in great quantities in the trachea, succeeded by increased hoarseness (*Lack.*, *two provings*, *2 gr. 2nd trit. for nine days and eight days*).

148*a*. Afternoon, frequent hawking of mucus, rough voice, and irritation to cough (*Mz.*, *1st. trit.*).

149. On the first day, along with the symptoms of coryza, &c., described at No. 44, she had a pressive aching at the upper part of the larynx, increased after speaking, and the voice fails in speaking. This aching changed to a tickling which extended to the throat and ears, and at night amounted to burning and scraping in the throat and upper part of the larynx to the hyoid bone. Next day the dryness in the throat causes frequent swallowing, which is attended with tearing. On the third day, in the night, the burning in the throat ceased and she began to cough. On the fifth day the cough continued, as frequent short cough in the morning, and during the whole day much tickling in the larynx, exciting short dry cough. In the night a nauseous sweet taste, as if blood began to rise up from the chest into the mouth. The dry tickling cough continued day and night in frequent paroxysms, and was accompanied by aching in

the middle of the sternum and in the larynx up to the hyoid bone. When she coughs stronger it brings on the bloody taste in the mouth. The symptoms subsided in five or six days, and the cough ended then with expectoration of sweetish yellow sputa tasting like pus (*N.*, *1st dil. 1 gr.*).

149*a*. Catarrhal scraping in fauces, which increased to cough, tickling and cough on inspiration (*Mz.*, *1st dil.*).

149*b*. Evening in walking tension in left side of chest more externally. Pressure and burning below right axilla; tension in the right half of chest at insertion of pectoral muscle. Stitches in the region of left (male) nipple, which vanish in a couple of hours, but are recalled by deep breathing. Tension in front of chest worse on deep breathing (*Zl.*, *1st trit.*).

149*c*. Pain in a spot to the right of the middle of sternum, with oppression of the chest (*N. and A.*, *2nd dil.*).

149*d*. Forenoon, sudden shooting at inner surface of sternum, soon after violent griping and shooting in the guts (*Lack.*, *1st dil.*).

149*e*. Dull pain in whole chest as if raw, at times troublesome pressive aching across the chest with anxiety (*Mz.*, *1st trit.*).

149*f*. Dull aching pain in right side of chest through to back which came on each morning while the drug was taken, and returned the third day after it was omitted (*M. J.*, *1st dil.*).

149*g*. Sensation of choking on lying down (*J. D. Johnson*).

150. On the second day he had a pressing squeezing sensation in the upper part of the right lung, which on exertion increased to a shooting pain and lasted the whole day. Next day the shooting increased, so that in walking he had to bend towards the right side, and draw very short breaths. It gradually diminished and went off in three days. Along with it there was frequent sneezing, which caused a violent stitch in the sore part of the right lung. Also in swallowing a morsel at dinner he felt the same pain (*Mz.*).

150*a*. Was suddenly seized with a burning shooting pain, as if from sharp cutting knives in the middle of the chest, so severe that he was obliged to throw down what was in his hands and press them firmly on the chest. After sitting quiet for two minutes the pain gradually subsided, but returned even more violently on any attempt to resume the work he had been engaged on. The pain begins at both sides below the clavicles and spreads over the walls of the chest, the ribs, the nipples down to the region of the short ribs, but is most violent in the middle of the chest. The pain resembles the burning produced by walking against the cold north wind; nevertheless it is not only burning, but sharp cutting. Deep breathing hardly increases the pain, the latter rather causes inclination thereto. Warmth relieves but does not remove it. It is accompanied by cold feet and horripilation over the back and thighs. There is lively quivering on the scapula and back, as a fluid dropped over the flesh, with pulsation in rapid interrupted movements like the dial of a telegraph. These pains returned frequently for a quarter of an hour at a time all the forenoon, and were markedly relieved after a basin of soup, and disappeared altogether after dinner (*Schz.*).

Among the Workmen.

151. There was the usual soreness of nose and excessive sneezing and coughing and running of the eyes and nose from exposure to the open air when the least cold (*B., f. Ch. W.*).

152. Chronic loud cough from "stuffing" at the epigastrium, chiefly on waking in the morning, he has then a fit of coughing and expectoration of tough mucus, with lightness in the head. Dyspnœa with much cough and expectoration of black tough mucus, difficult to detach. Capricious appetite. In the morning gnawing pain at the epigastrium, with sensation of emptiness and faintness (*Ch. W.*).

153. Dyspnœa, especially in the morning, with cough and expectoration of white mucus "as tough as pitch," and which could be drawn out into strings (*Gall., Ch. W.*).

154. Cough with expectoration of yellowish green tough matter (*Smk., Ch. W., after two years*).

155. "Stuffing" cough with pain at the chest, and expectoration of yellowish heavy tough matter (*Hwe., Ch. W.*).

156. Hard cough, with weight and soreness in the chest, and copious expectoration. Dyspnœa and slight pains in the chest (*Hnn., Ch. W.*).

157. Pain, stuffing, and ulceration of nostrils and sneezing, then cough in fits, lasting for ten minutes, from tickling at the bifurcation of the bronchi, with expectoration of reddish mucus (*Sm., Ch. W.*).

158. Continued to work until five weeks ago, when he had to leave, and for four weeks suffered from the following symptoms:—Pain in the back extending from lumbar region to the nape of the neck, striking through to the sternum, with oppression at the chest. Dyspnœa and cough, at first dry, but speedily followed by expectoration of dark-coloured very tough mucus. The cough and expectoration still continue. His general appearance is anæmic. The tongue is covered at the roots with a thick coating of *yellowish* fur. The tonsils and fauces generally have an erythematous injected appearance (*Hgn., six months, Ch. W.*).

159. His health before working here was always good, but in a fortnight he was seized with tightness across the chest, oppression and dyspnœa, attended with a hard dry cough which lasted six weeks, when expectoration of dark grey mucus of the consistence of white of egg came on. Soreness of the chest exists at present, and he still feels much oppressed on making any exertion. Has febrile paroxysms night and morning. The tongue at the root thickly coated with a yellowish-white fur, and he complains of indigestion. Load at the stomach, eructations of flatus and acid matter; the bowels are always costive, requiring frequently cathartics which produce temporary relief. Has dull aching pain in the loins, and the urine is of a brownish hue (*Gds., Ch. W., for twenty weeks*).

159*a*. A workman, aged fifty. Five or six days after beginning the work at the neutral chromate, epistaxis, coryza, and violent headache, then suffocative attacks of dyspnœa, orthopnœa at night, which continued till he gave up the work (*Del. and Hil.*).

159*b*. Intense dyspnœa and abundant sonorous râles in the chest (*Del. and Hil.*).

159*c*. Respiration impeded with oppression and pain in the sides, followed by cough and expectoration of indurated mucosities in large masses the size of a finger. In the night frequent attacks of suffocative dyspnœa with no relief till these masses are expectorated (*Del. and Hil.*).

160. Violent cough proceeding as if from a small spot in the epigastrium, painful to the touch. Loud wheezing cough for five minutes at a time, with retching and expectoration of tough mucus, so viscid that it can be drawn in strings down to the feet. Immediately on waking violent wheezing and panting; then violent cough, causing him to sit up and bend forwards. On lying down at night, and in sleep, the cough is absent; but he has then wheezing and rattling in the chest, heard at a distance. After meals swelling and heaving of the stomach, and the cough comes on. The cough is accompanied by pains in the loins and sides, causing him to hold them. After the cough he has pain and swimming in the forehead, almost causing him to fall. Besides the cough, he has weight in the head; weakness of digestion, so that the stomach is disordered by any but the mildest food. Dislike to meat and disordered digestion from it; habitual constipation. Emaciated, and looks aged, and great weakness, so that he was obliged to give up work (*Emm. Ch. W. came on soon after he came to the works and continued for months. Got quite well in three or four weeks under homœopathic treatment, chiefly nux and phos.*).

160*a*. Mr. Mavor experimented on a horse with doses of twenty to sixty grains of the pure bichromate, and produced a rise of temperature to 104·6°, and pulse to 60, cough, inflamed throat, reddening of conjunctiva, increase and more frequent discharge of urine, loss of appetite, yellow mucous discharge from nostrils—the symptoms of influenza complicated with bronchitis, as he thinks (*Veterinarian*, June, 1873).

Pathological Anatomy.

Respiratory organs.—In Case 13 in the upper part of the larynx, between the ligaments of the glottis, were found blood-stained coagulated masses, which could be separated from the walls of the windpipe like a membrane. In the bronchi were also found similar polypus-looking masses of mucus tinged with blood, which could be traced like cords through all the branches of the air-tubes. These masses when put in water were softened and coloured it red, at the same time being partly blanched, but did not swell up in vinegar or ammonia; they were, therefore, not fibrine, but mucus coloured with the red matter of the blood. In 16 the epiglottis and rima glottidis were congested and covered with thick ropy mucus. The internal surface of the larynx was highly injected and covered with muco-purulent matter. The trachea throughout its whole extent was very much injected, and lined with a dirty whitish coating like a false membrane, which could be easily detached with the back of the scalpel. This false membrane did not reach below the bifurcation, although the redness extended into the ramifications of the bronchia as far as they could be traced. The lungs were apparently healthy, except that the dependent portions were congested with blood; they floated with the heart, however, in water. In 17 the same thick purulent mucus lined the larynx and trachea; but there was no false membrane or injection. In 18 the larynx and trachea

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Heart.—In all cases the auricles and ventricles were filled with dark clotted blood. In 26 the heart was enlarged to nearly the size of a whole lung. In 27 the heart seemed larger than both lungs put together; the pericardium was reddened, and the coronary arteries full of blood.

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Commentary.

The specific action on the mucous membrane of the respiratory organs is well and characteristically marked. Not only are there signs of catarrh in all stages from dryness up to excessive secretion of an especially tough and viscid mucus, but an actual false membrane is thrown out in the experiments when the drug was introduced subcutaneously at a distance. It is, therefore, analogous to states of inflammation, superficial suppuration, thickening and disease of bronchial tubes and formation of mucous polypi, also to true croup. We may hence expect it to be curative in these states and also in laryngitis, tracheitis, bronchitis, acute and chronic, humid asthma, and influenza; also to muscular and nervous pains in the walls of the chest and the bones, not, however, in pneumonia itself. § 151*a* seems to point to angina pectoris. Among the more peculiar symptoms the analogous medicines are: tickling at top of larynx causing cough on first lying down teu.; cough at each inspiration from tickling at larynx, bel., bro., pul.; pain in lung in swallowing, bor., mer., thu.; cough causing to sit up and bend forwards, ars., hyo., nic., pho.

Heart.—The signs of distension and enlargement of the heart in the experiments are somewhat inconsistent apparently with the poverty of functional disturbance in the provings. On this subject Priestley says, "With regard to the heart, I do not think we can attribute to chromium any direct or special action upon it. The introduction of a comparatively large amount of a strong solution of any salt into the blood must necessarily disturb the coarser physical characters of that fluid so as to cause it to react upon the tissues it bathes in a manner injurious to their functions, but this is not, rightly speaking, a special action." Notwithstanding the truth of these remarks, I think that the frequency of the dilatation of the cavities in the chronic poisonings, and the pains in the region of the heart spoken of in the provings do show a slow action on the muscular tissue of the heart, although neither the cardiac nor spinal nerve centres are specifically affected.

Therapeutics.

Experience in disease has fully confirmed the expectations raised by the marked action of this medicine on the respiratory mucous membrane from the nares down to the extremities of the bronchial tubes. Besides those affections, including hay-fever, included in the section 'Nose,' it has been found good in many varieties of coryza and tracheal catarrh and epidemic influenza. Two cases (41 and 42) by Dr. Hilbers are given in the former edition characterised by running in nose and eyes, pain in frontal sinuses, soreness down throat and chest, severe cough, fever, and prostration. In common with many others, I have had frequent experience of its utility in similar cases, and think it probably second only to arsenic in epidemic influenza. I have also had several cases of severe frontal and occipital headache caused by pent-up mucous or purulent secretions, in the frontal sinuses during acute catarrh in which the K-bi. was successful. In laryngeal catarrh

and hoarseness, in addition to the following case I have seen others benefited where there were hoarseness and loss of voice, harsh cough, feeling of lump, and expectoration of blackish lumps:

CASE 43.—*Case of hoarseness, by A. M., in the Austrian Journal of Homœopathy*, vol. iv, p. 634. "My little boy, aged 2½, has been troubled almost constantly for the last nine months with hoarseness and want of clearness of the voice, for which several medical friends recommended a variety of medicines, which I had already administered without benefit. The child was also inclined to constipation. I gave a globule half the size of a pinhead of the first (decimal?) trituration of K. bich. Thereupon he had diarrhœa which lasted about two weeks, and was then treated with china; but since the time he took the K. bich. the voice is clearer than is often agreeable, and his health is excellent."

Laryngeal catarrh.—After cold a tenor singer had dryness in fauces passing into hoarseness which spread into the larynx; voice rough and hoarse; short dry cough; posterior wall of pharynx coated whitish grey. After spo. and iod. had failed K-bi. 2 cured in a few days (*Teller-Œhme* i, p. 740).

Pseudo-membranous croup.—The actual production of a false membrane in the trachea in the experiments with this drug, combined with the strongly marked laryngeal symptoms in the proving, naturally excited strong hopes that it would be a valuable remedy in membranous croup. Accordingly from the beginning I have kept it in view in all cases in which the well-known remedies for the early stage, viz. aconite, spongia, and hepar proved insufficient, and I can call to mind several severe cases in which the signs of formation of this membrane had set in where our remedy proved successful; one in particular, where in the time of extremity the parents were on the point of abandoning the homœopathic treatment in despair, but yielded to my representation that surely a drug which possessed the power of specifically acting in health on the very tissue implicated was far more likely to be useful than blisters, expectorants, and emetics which could at the most help to dislodge a membrane already formed, but could hardly prevent fresh formation. The result of perseverance with K. bich. 3 every hour was speedy and complete cure. The experience of Dr. Payne, of Bath, in America, in 1846, is given in full in the second edition of this proving, and is unnecessary to repeat in detail. After describing the failure of aco., spo., bel., hep., iod., pho., he states that the study of this proving impressed on him the resolution to keep it in the foremost place in future. He then met with a case very similar to one which had proved fatal under the above medicines. The onset was gradual; excessive dyspnœa with whistling metallic sound; voice hoarse; cough hoarse, dry, barking, or crowing; elastic plug of mucus in one nostril; puts his fingers to his throat; restless, hot, and sleepless; deglutition difficult and painful. Under K-bi. 6 recovery. Dr. Kitchen, of Philadelphia, was led by similar reasoning and the failure of the known medicine, to K-bich., and soon had some successful cases, one of which, with well-marked signs of membrane, is given in the second edition; another in the *Am. J. of Mat. Med.*, 1872. It was a fair-haired child, æt. 4, and the disease so far advanced that the doctor hardly expected to find it alive at next visit. The difficulty of breathing and

deglutition were such that he could scarcely get the doses of the 1st dil. swallowed. In three hours there was a complete change, and the little patient recovered rapidly. He says, "From that time my chief reliance in croup has been on K-bi." He still, however, frequently alternates it with hepar, with perhaps occasional doses of aconite or phosphorus. Dr. Black also gives a case of marked action of K-bi. 6 every quarter of an hour, after hepar had ceased to be beneficial. Dr. Bayard gives a similar case described in full in the second edition. The cough and respiration were characteristic, and the fauces were inflamed and swollen, and the general symptoms very pronounced, so that death seemed imminent. K-bi. 6 was followed by speedy amendment and ultimate cure.

CASE 53.—*Laryngitis.*—Dr. Russell has communicated the following case: "The patient was a gentleman, aged 45; he had been taken ill the day before I saw him, and had been hot and restless the whole night. I found the pulse 110 in the minute, and the face flushed; he had very frequent cough, hard and barking, attended with a little tenacious mucus and pain at the larynx and top of the trachea, increased by pressure; no pain nor any abnormal sound on percussion and auscultation in any part of the chest. I began with aconite for the first six hours, a dose every hour, and then gave acon. in alternation with Kali bichr. 3. The general symptoms were better next morning, but there was still much hard cough and pain on pressure, and slight fever; I continued the Kali bichrom. the whole of that day and found the symptoms gradually ameliorating, and in the course of the third day the tough expectoration had given place to an easier kind, the pain was gone, and the patient was in every respect in a state of convalescence.

I should be inclined to place K. bich. very high among the list of medicines for laryngitis of adults.

Among other similar cases, I have reported No. 54, in which the patient, a middle-aged woman, had paroxysms of hard, very deep cough, was unable to lie down, had loud, hissing inspiration, tenderness of larynx, sputa tough, and fever. K-bi. 2 every three hours effected a cure. Dr. Black reports its utility in a case of chronic inflammation of the fauces extending into the larynx with tearing cough every five minutes, worse after meals and at night, excited by tickling in the trachea, which is tender to touch, the expectoration scanty and very difficult. Dr. Roche gives a similar case.

The following cases are reported by Dr. Meyhoffer, of Nice:

CASE 56*a*.—*Catarrhal laryngitis.*—A man, aged 28, after cold and damp had for six months: voice hoarse, rough, and hollow; cough trifling and attended in the morning by the expectoration of tough glutinous greyish mucus; no pain on pressure on thyroid cartilage; the ary-epiglottic ligaments, the ventricular bands and lining of the posterior part of larynx dark-red, puffy, and partly covered with a greyish mucus; vocal cords slightly injected, and some varicose veins in the pharynx. K-bi. 3, six drops per diem for six weeks removed all the above symptoms and morbid appearances, except inability to raise the voice to a higher pitch, which yielded to causticum 3 (MEYHOFFER, *Ch. Dis. of Organs of Respiration*, i, p. 56).

CASE 2.—Man, aged 36. After cold, hoarseness; violent spasmodic cough provoked by speaking or laughing, with scanty, stringy, muco-purulent sputa; dryness and intolerable tickling in the larynx when speaking; little tenderness to pressure; to laryngoscope, arches of palate and pharynx bluish red; posterior part of epiglottis, the ary-epiglottidean fold, ventricular bands, and front and back of larynx dark red and swollen; vocal cords puffy and covered with mucus, their motion slow and approximating but incompletely during phonation, their redness growing more

intense. K- bi. by inhalation, gr. ij in ℥ss. of distilled water; forty inhalations a day, gradually increasing to eighty. (Lewin's steam apparatus, which is a modification of Seigel-Bergson's steam hydrohonion, used by Dr. M.) In about four weeks the larynx and voice were restored to health. Dr. M. considers the local application of the drug as here done more powerful than the ordinary mode. The result in this case was evidently due to the specific quality of the drug, for the spray of the Eaux Bonnes had already been inhaled without any good result (op. cit., p. 58).

Dr. Meyhoffer adds: "We know no remedy equally efficacious in chronic laryngitis when congestion, swelling of the tissues, and increased secretion of a glutinous mucus are the chief characteristics of the morbid affection."

The following case occurred in my practice:

CASE 58.—*Syphilitic affection of the larynx.*—E. M., a fair-haired, unhealthy child of two years of age, was brought to me on the 30th May, 1849. She had been syphilitic from birth, and had been treated for long, and had had much mercury, and the parents despaired of its recovery. The child had an unhealthy complexion and anxious look, and the breathing was difficult and loud, with wheezing as if from obstruction in the windpipe, audible at some distance: there was complete loss of voice, even in crying; a faint, husky cough. At night there was much dyspnœa and rattling in the throat during sleep, and she is often awoke by it. There is ulceration at the angles of the mouth and soreness round it. . Eruption round the anus. I gave K. bich. 6, every six hours. On the 5th June she was altogether somewhat improved, and the breathing better; but the eruption and soreness at the angles of the mouth was not better, and was very troublesome. Arsenic 6, and then ars. 3, were given night and morning, each for a week. On June 18th she was still farther improved, and the mouth much better, and also the breathing better. Cont. ars. 3 bis die. On the 28th June the mouth showed only one slight crack. The eruption at the anus and the laryngeal symptoms were much the same. K. bich. 3 bis die. 13th July, there is more voice, and she is altogether improved; the cough is observed chiefly when she drinks; mouth is quite healed. 25th July, the voice is now quite good, and there is scarcely any cough; the appetite is good, and the child gets stronger and thrives. Cont. K. bich. 4th August, the child is quite well, except the eruption at the anus, which comes and goes—at times scarcely visible, at others elevated and raw. It was finally removed under sulphur in different dilutions.

K-bi. is an excellent remedy in non-specific laryngeal affections in syphilitic individuals" (*Meyhoffer*, p. 187).

In acute and chronic bronchitis K-bi. is now established as one of the cardinal remedies to be always kept in mind and given at this stage and under the circumstances indicated by correspondence with the pure symptoms. It is hardly necessary to give individual cases, but merely to note the salient points in the numerous cases in which it has been successful. Cough violent and ringing with tough difficult sputa; burning raw pain down throat and sternum; dyspnœa and wheezing, compelling to sit up in bed. Loud wheezing and rattling audible at a considerable distance. Excessive tough sputa, which can be drawn out into long strings; viscid sputa in grey lumps; epigastric pain and flatulence. Tough blackish lumps; cough with difficult expectoration of slate-coloured mucus in the morning; rough cough from irritation at sternum and scanty viscid mucus, and dyspnœa as if lung could not expand fully; cough worse after eating or drinking. Rattling in the chest and dyspnœa on lying down. Cough excited by exposure to smoke; wheezing in bed. Increased soreness in a small spot in the chest as if an ulcer was there. Chronic bronchitis brought on by inhalation of arsenical vapours. Cough with pain at sternum. Cough

at night and pituitous vomiting in the day. Wheezing at night remaining as the only symptom after whooping-cough. Recurrent paroxysmal attacks of cough, vomiting, and gastric disturbance after whooping-cough four years before. Dr. Black reports it useful in a case of bronchitis with tough sputa in a case of scirrhus of the lungs.

Meyhoffer recommends K-bi. in the subinflammatory states of the respiratory mucous membrane shown in chronic bronchitis "either attended by violent fits of coughing, splitting headache, and muscular weakness, or by that wearisome morning cough which ceases only after the expectoration of a gluey phlegm." At the same time inhalation of ¼ to ½ a grain to the ounce of distilled water should be used (vol. i, p. 325).

Wallace reports two cases of whooping-cough in which the expectoration was so tough that it could be drawn in strings to the ground.

Bronchitis.—"Inhalations and internal use of K-bi. form our standard course of treatment in those numerous cases of common bronchitis vacillating between the acute and torpid inveterate character of the disease. Inhalations do good service in bronchial dilatation with fœtid breath and expectoration. If the catarrh be attended with periosteal or rheumatic pains of a chronic character, all hesitation as to the relation of this medicine must subside" (*Meyhoffer* i, p. 386).

Dr. Kitchen says, "In mucous coughs, in which there is a profuse yellow expectoration showing a considerable primary inflammation which has run into an obstinate chronic condition, it affords almost immediate relief. I have cured cases of this nature in persons who have been unwell for weeks, in a few days. It often relieves the cough in phthisis." He gives a case where he prescribed a powder of the first decimal for a copious mucous cough. "I saw the gentleman the day after, when he told me the powder had nearly killed him; having taken it on an empty stomach about an hour before dinner it vomited him severely and prevented him enjoying any dinner. 'Well,' said I, 'what of the cough?' 'Oh! as to that, I have not coughed from that hour to this.'" This is instructive, and shows that a dose large enough to induce physiological symptoms in one organ does not necessarily aggravate the disorder of another organ on which the drug acts specifically through absorption or sympathy.

Kitchen uses K-bi. in whooping-cough when there is much gluey mucus and night sweats, also when there is frequent vomiting.

Kitchen says it is the best remedy in cough after measles frequently of a dry, hacking, and troublesome nature.

We have no reason to expect any good from this remedy in the ordinary forms of pneumonia; but it is otherwise in the pneumonia notha, or catarrhal pneumonia, which is the extension of catarrhal and frequently plastic inflammation of the bronchia into the smaller bronchial tubes, finally implicating the parenchyma of the lungs. This insidious form of pulmonary inflammation is liable to occur in some epidemics of catarrh and influenza; and in searching for the appropriate remedy I think K. bich. should be kept in view.

Measles.—From the nasal, bronchial, and skin symptoms, Dr. Lippe thinks it should be often indicated in measles. In this I agree,

and have found it often useful at certain stages of that disease, viz. after the fever is partially subdued by aco. or gel. For fever not lying in the sphere of its action we cannot expect it to cover the whole disease. It is more like the analogue of the secondary syphilitic rash, which often is very like measles without the fever, and running a much longer course. (See section Syphilis.) In the croupy cough with tough expectoration occurring in measles it is also curative.

HEART.

Although enlargement of the heart even to a remarkable extent is shown in the experiments on animals, yet with the exception of pain in the cardiac region, there are extremely few symptoms in the register that relate to that organ. It is difficult to say whether this arises from a different action of the substance on men and on the lower animals, or whether its action is of that slow character on the nutrition of the muscular tissue of the organ that would not give rise to any perceptible symptoms within the limits of an ordinary proving. If the latter should be the case it may be found useful when given for a sufficient length of time in passive dilatation.

Liedbeck reports benefit in hypertrophy of the heart with insufficiency of the aortic valves. I have also seen benefit in chronic pains and muscular weakness of the heart after rheumatic endocarditis.

BACK, KIDNEYS, &c.

161. Dull pressive pains in different parts of the back, going off in the evening. Deep-seated aching at upper angle of left scapula (*Dle., seventh day, 1st. dil.*).

162. Rheumatic pains between seventh and eighth ribs at their angles on the right side, increased on raising or twisting the body to the left. Transient stitch at the inferior angle of left scapula, then a similar pain in the toe (*Wkr.* $\frac{1}{30}$ to $\frac{1}{3}$ *gr. daily for ten days*).

162*a*. Tension in the muscle sheaths below back, specially felt on bending forward and on moving arm. After eating, drawing in all the muscles of the back and into the upper arms, loins, sacrum, and thighs (*Zl.*).

163. On second day, darting pains in renal region and severe stitch in lumbar region, aggravated by inspiration and cough. Third day, transient dull pain under right scapula; sharp shooting pains first in left then in right renal region, extending down the thigh, aggravated by inspiration and coughing, on fourth. The lumbar pain felt next day also. On the eighth, cutting pain on left side of sacral bone shooting up and down (*Dgn., l, d.*).

164. Vertigo and heavy pain in the vertex subsiding in six or eight hours, then severe pain in the lumbar region, extending into the sacrum and down the thigh, at first aching then increasing to a numb sensation so severe that he could scarcely rise from the chair.

It continued three days and gradually decreased in severity. The urine was scanty, high-coloured, and deposited a pearly white sediment; no irritation in passing it (*Hln.*, 90 *gtt.* 1*st dil. in three doses, one day*).

165. At times, for about a week or a fortnight, he has pains across the loins and scanty high-coloured urine (*B. F., Ch. W.*).

166. Was seized with pain like a knife through the loins, suddenly, so that he could scarcely walk in the afternoon. He was with difficulty helped home, and had great pain all night, and could not sleep all night more than an hour for the pain that continued even when still, but greatly worse on moving or turning; he had frequent desire to pass urine, with scanty reddish urine. He [got some nitre and] was somewhat relieved, so that he could go back to work next day, but remained with pain in back and scanty urine for a fortnight (*Ch. W., aged nineteen*).

167. Bitter taste in the morning; aching at the inferior angle of right scapula (*Fan. Ch. W.*).

168. Aching pain in the back, running down on the left side into the hip. Urine red. Dryness in mouth and throat. Sight confused and dim; singing in the ears (*Hem. Ch. W.*).

169. Stabbing pain from the third cervical to the fifth dorsal vertebra, striking forward through the chest to the sternum, increased on motion, with inability to straighten the spine after stooping. It prevented him from working for six weeks. Constipation with pain across the loins. Heartburn only in the evening after tea (*Swy. Ch. W.*).

170. Occasional attacks, lasting about a week, of aching pain in the region of the kidneys, extending to the groins, worse after rest, with scanty reddish urine, nausea, and impaired appetite (1 *Ch. W.*).

171. A dyer, in a fit of rage, took a piece of bichromate of potash, dissolved it in water, and swallowed the solution. Nausea immediately came on, and, after copious draughts of milk, soap-water, and oil, violent vomiting was produced. After the stomach was completely evacuated, the patient felt well and free from pain, and walked about, and in the evening ate his supper with appetite and refused to have medical advice. The night was passed quietly. Next morning after getting up he felt such weakness that he was obliged to lie down again; the belly was neither swelled nor painful; the pulse quiet, but small. The patient felt only some shooting pains in the back and in the region of the kidneys, and a feeling of scraping in the throat; he was able to eat, and he drank large quantities of pure water and demulcent drinks; he had several stools of natural colour and consistence, but did not pass a drop of urine. The second night was somewhat restless, and next morning the patient was very much weaker; he had scarcely power to rise, and trembled greatly on making the attempt, but without, however, feeling any increase of pain. At a later period he could scarcely raise himself up, and he sank back on making the attempt, but his spirits remained good, and he felt sure he would soon be well. The debility increased, and the patient died sleeping calmly, in fifty-four hours after taking the

poison, as if from pure exhaustion, without any disturbance of the mental faculties. Some hours before death the white of the eye became coloured yellow, and shortly before death spasmodic contraction of the hands was observed. On dissection, the stomach was found unchanged, the duodenum slightly reddened, the liver coloured yellow, the spleen gorged with blood; the kidneys were large, and when cut open, deeply marbled red, filled with frothy blood; bladder empty. The fluid in the stomach still showed the presence of chrome to chemical tests.

171*a*. Dr. Roberts ('Urinary Diseases,' second edition, p. 452) reports a fatal case of chronic pyelitis probably due to K-bi., as follows:— In March, 1857, I admitted into the Manchester Infirmary a man greatly emaciated with hectic symptoms. The urine contained a large quantity of pus; its reaction was acid; it contained no casts of tubes nor more albumen than the pus accounted for. The patient stated that his water had been milky for more than a year, and that his health had been gradually failing for about the same time. He had never passed any gravel nor had he ever suffered from nephritic colic. As far as he knew the urine had never been bloody. He attributed his complaint to the nature of his occupation, which was to manufacture bichromate of potash. He died eleven days after admission. At the autopsy the thoracic organs were found perfectly healthy, as were also the liver, spleen, and intestinal tract. When the bladder was opened some injection of the mucous membrane was found, but it was not thickened and the viscus was not contracted. Both ureters were dilated to about double their usual size and filled with pus. The two pelves and the infundibula were enlarged and their lining membrane opaque and bathed in pus. The kidneys presented very slight signs of disease, the papillæ were flattened and yellowish as if they contained pus within their ducts, the remainder of the renal tissue appeared healthy. No foreign body was detected in either pelvis, and the path of the urine was free throughout. Death could only be attributed to the long-continued exhausting purulent discharge which had been allowed to go on without an attempt to check it until eleven days of his death.

Pathological Anatomy of Kidneys, see p. 529 and above.

INDEX (*local symptoms from* 161 *to* 171*a*).

Numb feeling, 164.
Peculiar undulating contraction of the muscles of the right side of the back, 204[23] (gen. pains).
Stiffness of nape, 203, 193[4], 197.
Cannot straighten himself, 6, 169.
Sweat on the back and thighs, 93.
Cramp in nape, 96*b*.

Pains.

Dull pressive, 161, 106, 136[13].
Darting in renal, 163.
Stitch, 163.
Shooting, 171, 135.
Cutting, 163.
Sudden, like a knife, 166.
Stabbing, 169.
Like a blow, 200[11].
Tearing in nape, 203.

Conditions of Pains.

Night, 135[9].
Morning, 200[4].
Evening, pains better, 161.
Touch, 200[3].
Bending forwards, 162*a*.

Bending head, 196, 203.
Twisting body, 162, 166.
Moving arm, 162*a*.
Walking 200[3].
Motion, 169, 203.
Worse after rest, 170.
Eating, 162*a*.
Hindering micturition, 200.
During coition, 200[9].
Better after stool, 200[20].
Cough, 163.
Inspiration, 163.
Awaking, 204[35].

Concomitants.

Pain, with scanty high-coloured urine, 165, 170.
Frequent micturition of scanty red urine, 166.
Nausea and bad appetite, 170.

Direction of Pains.

Renal to groins, 170.
Dorsal vertebræ to sternum, 169.
Pain from the loins to the nape, and through to the sternum, 158 (cough, &c.).
Loins to thigh, 164, 162*a*.
— l. hip, 168.
Arms and thighs, 162*a*.

Succession of Symptoms.

Pain at angle of scap., and then in toe, 162.
Shooting in one and then other renal region down to thigh, 163.
Vertigo and headache, then lumbar pain, 164.
In sacrum, then in thigh muscles, 200[12].
From hip to sacrum, 196.

Locality.

Nape, 203.
Scapulæ, pain in left scapula, 104 (gastr.)
— dull shooting under left scapula, in the evening, 135 (abd.).
Between scapulæ, pain pressive, 136[12] (abd.).
Pain between scapulæ, in the front of the chest and in the extremities on waking, 204[35].
Up angle of l. scap., 161.
Up angle of r. scap., 163.
Angles of seventh and eighth ribs, 162.
Inf. angles of l. scap., 162.
" r. " 167, 129[7].
Below scapulæ, 135[9].
Pain in the middle on the right, 135[18].
Renal, 163, 170, 171[11].
Lumbar, 163, 166, 159.
Sacrum, 163, 200.
Coccyx, pains in, in the morning, 200[1] (gen. pains).
— — during coition, 200[9].
— in walking and in the act of sitting down, 200[14].
— relieved after stool, 200[20].

Therapeutics.

In have seen numerous cases of pains in the back and trunk removed by K-bi. according to the symptoms. These were generally connected with coughs, dyspepsia, or rheumatic and neuralgic affections of the back and chest and dorsal and intercostal nerves. In the back we have Cases 77 to 79 of lumbago in the former edition, one coming on as if something cracked in sacrum, another in the dorsal region and down both arms, so that he could not turn or raise his arms; another "like a gathering" in a small spot in the sacrum.

The erratic and widespread pains described in the section General Pains have been frequently relieved, more especially in gouty cases, where the symptoms corresponded accurately to those in the proving. In Case 84 general rheumatic pains had lasted for months, flying about to different parts of the body, a few hours in the shoulders, then in the back, then in the knees, then in the ankles and big toe; after K-bi. 30 for a fortnight all the symptoms were removed.

UPPER EXTREMITIES.

172. Violent tearing aching pain in the left shoulder (*Dle., 1st dil. and Tye. Ch. W.*). Rheumatic pains in both shoulders, worse at night (*Tye. Ch. W.*).

173. At night, soon after lying down, tearing pains in the shoulder and upper arm, on the side not lain upon; on turning the pain went to the other arm (*Dle.*).

174. On the first day he had now and then quite suddenly a violent crampy pain in the middle of the outer surface of the right upper arm, leaving the spot tender to touch (*Arn., l. d., 2 doses daily for two days.*).

174 *a.* Drawing in the muscle sheaths and in the bones of forearm (*Zl., 2nd trit.*).

175. Darting in the elbow on second, fifth, and seventh, and dartings in right wrist second and eighth, also severe throbbing. Darting in left wrist near pisiform bone for nearly an hour, and slight aching in second joint of fingers. Pain in right forearm and left elbow; at night pains in ulna. Burning in metacarpal bone and first joint of thumb (*Dgn., s. d. five days*).

175 *a.* Tearing in different joints, especially right wrist and finger-joints. Stitches in the metacarpal joint of right middle finger. Pain in bones of face and bones of right hand. Drawing in the back of hands and feet. Pain in bones of hand on awaking. Single tearings in the hand and both ankles. Sensitiveness in bones of hands as if bruised (*Zl. and Mz.*).

176. Fourth day, afternoon, a sharp wrenching pain on the radial side of the left hand that made him groan aloud. Tearing in ulna, which gives place to pain in tibia. On eighth, in the afternoon a few transient wrenches and stitches in the right axilla and hinder surface of left thigh; also frequent single jerking wrenching pain from right shoulder to elbow (*Zl., 1st dil. ten days*).

176*a.* Tearing and gnawing in bones of right arm, thumb, and fore-finger, then slightly in left; tearing in the bones towards elbow and wrist.

177. Tearing pain in the shin-bone and in the joints of the fingers of both hands, but especially so violent in the right thumb that he could not write for the space of an hour. Next day the pain in the thumb returned at short intervals till the evening, and it and the other pains gradually became less frequent and severe in the next two or three days. Dull pain in the region of clavicles. Beating in forearm, not synchronous with the pulse. Arms and hands as if bruised and lame (*Mz., 15 gr. 1st trit.*).

178. On the sixth painful tension at the extensor side of right thumb lasted the whole day, and is tender to pressure at the articulation of metacarpal bone of thumb with wrist. Next morning he awoke with such a violent pain in the thumb that he could hardly hold the pen, increased by every movement of the hand or arm, no swelling or redness visible. The pains continued the whole forenoon, and

were often so violent that he could not take his handkerchief out of his pocket; they reached up to the elbow; nothing to be seen; better in the evening, and next morning gone (*Zl.*, $\frac{1}{10}$ *gr. every four days for eight weeks*).

179. On the tenth day he had a sudden tearing and convulsive movement in the right deltoid muscle (*Lack.*, *2nd trit. seventeen days*).

179*a*. Weakness and weariness of arms, and one prover had at the same time distended veins (*N. and K.*).

179*b*. Stiffness painful of right arm, especially after rest. Formication or lameness of right arm disturbing sleep.

179*c*. Painful swelling of the glands under armpit and severe ulcers in the hands; inflammation and abscess of the uvula; sickness and general malaise; also the inflammation of eyelids, and next day pustules appear on the hands (*Beilby's case, see* 38).

INDEX (*local symptoms from* 172 *to* 179*c*).

Arms and hands as if bruised and lame, 193[11].
Coldness of arms, 92.
Convulsive movements, 179.
Jerking in little finger, 203.
Pain and jerking in upper arm and thigh, 183.
Spasmodic contraction of the hands, 171[21] (fatal suppression of urine).
Formication, 179*b*.
Pain and numbness in shoulder and elbow, 196.
Feeling of looseness in sh.-joint, 194.
Pulsation, 177.
Stiffness of arm, 179*b*.
— joint, 194.
Weakness and weariness, 179*a*.
— of hands, 105.
Veins distended, 179*a*.
Pustules on hands, 211, 38.
Papulæ on forearm, 212, 214.
Suppuration of axillary glands, 228.

Pains.

In paroxysms, 177.
Crampy, 174.
Bruised, 175*a*, 193.
Burning, as if scalded, 176.
Darting, 175.
Stitches, 176.
Piercing, 195.
Wrenching, 176.
Tearing, 177, 136[8].
Tension, 178.

Conditions of Pains.

Night, worse, 172, 173, 175.
Evening, worse, 224.
Better evening, 177, 128.
Afternoon, 176.
On touch, 174, 195.
On pressure, 178.
On side not lain on, 173.
On turning, pain goes to other side, 173.
Not lain on, 173.
Hindering writing, 177, 178.
Worse on movement, 178, 194, 195, 204[46].
Raising arm, 194, 204[46].
Better on movement, 203.
Awaking, 175*a* (hand).

Concomitants.

Nausea, 136[8].

Course of Pains.

Shoulder to elbow, 176.
Thumb to elbow, 178.
L. shoulder to breast, 204[45].
Vertex then shoulder, 204[7].
R. thumb,, then l. arm, then centre of ribs, 204[48].
R. axilla and l. thigh, 176.
Pain in forearm and legs, 176.
Forearm, then tibia, 176.
L. hand, then face, then r. knee, 64*b*.
Pains in shoulder, and left breast, on raising the arm, 204[46].
Right shoulder, then in left elbow, 128.
Pains in scapula, whole arm, hand, and thumb, disappearing on motion, 203 (genl. pains).
Pain in the left forearm and right side of occiput, 204[41].
Hands, pains in, feet, and back, 2 (vertigo).
— — and chest, 197 (genl. pains).
— — and forearm, 204[25].
Pains in wrists and pectoral and intercostal muscles, 201.
— — and external malleolus, 202.
Pain in right thumb, then left upper arm, then left ribs, 204[48].

Locality.

Whole upper extremities, 203.
Clavicle, 177.
Shoulder, 136[8], 194.
— left, 172.
— both, 172.
— joint, 194.
Deltoid, 179.
Axilla, 176.
Axillary glands, 179*c*.
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Elbow, 175, 176*a*.
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Ulna, 175.
Hands, 2, 193[12], 197, 204[36].
— radial side, 176.
Wrist, 201, 175*a*, 176*a*.
Wrist, right, 175.
— left, 175.
— and malleolus, 202.
Near pisiform bone, 175.
Thumb, pains in, 193[12], 203, 204[47], 175, 178.
Metacarpal of thumb, 175, 178.
Fingers, 176*a*, 175, 195, 203.
— second phalanx, 175.
— first „ of mid., 195.
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Joints of fingers, 175*a*, 204[30].
Bones and periosteum, pains in, of hand, 195, and face, 175*a*.
— — ulna, 204[36].
— — forearm, 195, 174*a*.
— — arm, thumb, and forefinger, 176*a*.

Lower Extremities.

180. Rheumatic pains in the hip, coming on at night (*Tgn. Ch. W.*).

181. Second, the whole right leg was painful, especially on the hip, that he could not lie on the right side that night. In the evening next day, after a walk, tensive, troublesome drawing pains in the whole right leg. Soreness to touch in the right groin and hip-joint. Cold feeling in thigh, some pain in great toe (*Zl.*, $\frac{1}{10}$*th gr. every four days for eight weeks*).

181*a*. Drawing tearing in left hip-joint. Wandering tearing pain at one time in the hips, at another in the knee-joint (*M. Z.*).

182. Rheumatic pains in the right thigh (*Cke. Ch. W.*).

183. On the second day, in the evening he had a drawing and jerking in single muscles of the thigh and upper arm. On the sixth day, also in the evening, he had sudden tearing pain in the left knee, very painful, and preventing every movement of the joint. This pain lasted about a minute and reappeared again in about half an hour (*Lack.*, *2nd trit. seventeen days*).

184. On rising from his seat a violent pain, as if dislocated in the knee, of short duration, repeatedly. Once a similar pain, but slighter, in the ankle-joint (*Lack.*, *two provings*, *1st trit. nine and thirteen days*).

184*a*. Sore feeling in right knee on sitting down and rising up. Tension in right knee. Tearing in legs at night; bruise pains in protuberance of tibia, first on one side, then on the other. Pain in right shin and hand; tearing as if in periosteum of right tibia, and then in bones of right forearm (*Zl. N.*).

185. Acute rheumatic pains and stiffness in the knees without swelling, felt only in walking and not at night (*Brrt. Ch. W.*).

186. On the fourth day external burning and smarting sensation over the right trochanter major. Ninth and eleventh days, tearing pain from left ham down the leg. Feeling of swelling or enlargement of the legs in bed (*Dle.*).

187. Pain in the course of the left sciatic nerve, extending from behind the great trochanter to the calf of the leg (*Dgn., Nn.*).

188. Darting pain down the outside of the left thigh (*Dgn.*).

189. On the ninth day, in the afternoon, a pain came on in the tendons of the muscles of the calf, as if stretched, much felt in walking and causing lameness. It extends up to the ham and down to the tendo Achillis. It continued two days (*Dle., 3rd dil. twice a day for ten days*).

190. Soreness in the heels in walking, continued for some days after the proving. Painful shooting in the second joint of the great toe, at night in bed (*Wkr., from $\frac{1}{10}$ to $\frac{1}{3}$ gr. about ten days*).

191. Pains, heat, and throbbing in the toes (*Dle.*).

192. Seven hours after the fourth dose he was attacked by violent enduring tearing pains in the bones; they were concentrated in both little toes of the lower extremities, and accompanied by very troublesome creeping pains; they reached such a grade of intensity that he feared both toes would tear themselves away; these pains lessened, indeed, in a few hours, but still continued during the night and next forenoon; then there arose slight pains in the thigh and small of back, which went off in a few hours (*Zoth., 1st trit. four days*).

Pathological Anatomy.

In animals, the posterior extremities were in a semi-paralyzed condition. Trembling of the fore limbs; cramps in the hind limbs. One dog could not put its paw to the ground, and it swelled up.

INDEX (*local symptoms from* 180 *to* 192).

Blisters on sole, 208.
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Formication and numbness in metatarsus, 195.
Feeling of enlargement, 186.
— of coldness in thigh, 181.
Heaviness of legs, 195 (pains).
Weakness of legs, 11.
Tumours on bone, 194.

Pains.

Short lasting, 183, 184.
Burning, 186, 191, 205 (skin).
Smarting, 186.
Soreness, heels, 190.
Drawing, 181, 183.
Creeping pain, 192.
Bruised or broken, 193[8].
Shooting, 190.
Jerking, 183.
Tearing, 183, 186, 192, 203.
Dislocation-pain, 184.
Tension, 189.
Throbbing, 181 (toes).

Conditions.

Day only, 199, 185.
Night, 180, 181, 190, 184*a*.
Evening, 181, 183 (knee).
On touch, 181.
Lying on affected side, 181.
Movement, 183.
— of hips (many provers).
Bending up ankle, 193[9].
Rising from seat, 184, 184*a*.
By sitting, 194.
Sitting down, 184*a*.
Walking, 185, 189, 190, 193[10].
Better by walking, 194.
After walking, 181.
On awaking, 284.

Concomitants.

Tearing in lower limbs, hands, and nape, 203.
Pains in legs and feet, forearms and hands, on waking, 284.
— shin-bone and finger joints, 177, 193[88].
— ext. malleolus and wrist, 202.

Pains in forearm and legs, 176.
— knee and chest, 198.
— hip, left breast, and shoulder, 198.
— toe and scapula, 162.
— shin and hand, 184*a*.
— thigh and axilla, 176.
— „ sacrum, 192.

Direction of Pains.

Pain in hip to sacrum, 196, knee, 11, (head) 198, 199.
— from back, 168.
— from trochanter to calf, 187.
— from ham down leg, 186.
— up to ham and down to tendo Achillis, 189.
Pain in thigh, from loins, 162, 163.

Succession.

From l. to r. tendo Achillis, 194.
From one big toe to other, 198.
Bruise pain in sacrum, then tearing in front muscles of thigh, 200[12].
Pain in knee after do. in liver, 128.
Tibia, then forearm bones, 184*a*.
Back to hip, 168.
One tibia, then other, 184*a*.
Shifting in hip- or knee-joints, 181*a*.
Pain in tibia, then forehead, 12.
— and ulna, followed by burning on surface of thigh, 204[38].
Pain in leg, after pain in sacrum, 200[16].

Locality.

Whole leg, 181.
Hip-pain, 180, 181, 198, 199.
— joint, 196, 181*a*.
— trochanter, 186.
Sciatic nerve, 187.
Thigh, 182, 200[13].
— outside, 188.
— single muscles, 183.
— itching eruption, 231.
Knee, 181*a*, 11, 184.
— l., 183, 198.
— r., 128.
— both, 185.
Calf, 189.
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Feet, broken or bruised, 193[8].
— dorsum, 11*a*.
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— ball of, 198.
Toes, 191, 192.
— as if they were torn off, 192.
Bones and periosteum, 12, 184*a*.

Therapeutics.

In the lower extremities we have Case 80 of sciatica; the pains down hip and outside of thigh worse afternoon and evening, better in bed; worse on any change of weather. Case 81, pain in knees and thighs without swelling.

Case 82.—*Acute attack of pain in the tibia, communicated by Dr. Black.*—"Mrs. D., aged 32, of phthisical habit and lymphatic temperament, was convalescent from a mild attack of gastric fever, when she had complained on the 4th August, 1850, for four days, of tenderness of the middle third of the left tibia, which gradually increased till on this day neither the foot nor leg could be moved. There was great tenderness and slight swelling, but no redness. The pain is described as boring, as if in the bone, and constant, with frequent paroxysms of acute pain extending up the anterior part of the thigh and down to the instep; increased by heat. K. bich. 3, glob. ij in water, a spoonful every hour to four hours, till relief is obtained. On the 5th the tenderness was much better; there were no paroxysms of pain, and she was able to move the foot; she experienced relief after every dose. The first four or five doses were always followed by a burning feel over both limbs, 'as if the medicine was searching through the veins.' In two days there only remained a slight pain of a different character in the instep, for which Ruta was then given with good effect."

Case 83.—*Periostitis from a blow.*—J. M., a man aged 50, got a blow on the shin with a bar of iron six weeks before. Since then he has an ulcer on the spot about the size of a shilling, and the skin and cellular tissue round it much inflamed; he has great pain in the leg when he stands. He has violent pain shooting up to the knee; stiffness of the flexor muscles of the knee. General health good. K. bich. 6, ter. die. In four days he had less pains, and the inflammation was less. He now

got K. bich. 3, and the lotion externally. In eight days the sore was nearly healed, but still he had the shooting pains up to the knee, which he could not straighten. The medicine was continued at intervals, with steady amendment, for four or five weeks, when he reported himself well.

I have found K-bi. useful in a case of chronic relaxation of the calceo-navicular ligament with projection of the navicular bone and turning out of the foot.

General Pains and Affections of the Fibrous, Muscular, and Osseous Tissues.

193. Second, at noon, drawing tearing pain in several parts of the upper and lower extremities, in the right ankle-joint and shin-bone, also in the right big toe and right thumb, of particular violence; transitory stiffness of neck; toothache with stitches in the left ear and temple. On the third, single fleeting but violent stitches in the left ear, fleeting drawing and tearing in the left molars, and also in various joints of the limbs, vague, and quickly changing place. Violent pain in the bone of the leg towards the ankle, as if the feet were broken or bruised; intolerably increased on bending the ankle upwards, impeding locomotion, coming on about three hours after the medicine; and on the following day, at the same time, arms and hands as if bruised and lame; the thumbs of both hands especially painful; stiffness of neck (*Mz.*, *two provings*, $\frac{1}{10}$*th gr. daily, seven and eleven days*).

194. Pain in the right shoulder-joint on motion, and feeling of looseness of the joint—third day. For the next two days it continued much the same, and on the sixth it increased to stiffness of the joint and painfulness on being raised high. Eleventh and twelfth again worse; went off on fourteenth. On the fourth he had swelling and pain in left tendo Achillis, which on the sixth was diminished by walking; but came after sitting. It continued till the ninth, and on that day the right became also affected in the same way and hindered walking. Eleventh.—Pain went from left tendo Achillis and stayed in right. On the twelfth, he observed a small hard swelling, painful on firm pressure, on right inner malleolus. On the fourteenth the swelling at the inner malleolus increased; it is very hard, and has a rhomboid shape, not moveable on pressure, painful only to strong pressure, and seems to be seated on the bone: it went off in three or four days (*Arn.*, *eighteen days*, *10th 7th, and 3rd dils. each for some days, two doses daily*).

195. On the first, heaviness of the legs while sitting. On the third, pain in a fixed spot of the outside of the upper part of the forearm, chiefly in the muscles, and partly in the periosteum; the spot is sore on touch. On the fourth, slight drawing in the bones of the right hand; heaviness of right leg. On the sixth, a fleeting but piercing pain in the bone of the first phalanx of the right middle finger; in sitting sudden numbness and creeping in the right metatarsus (*Zlat.*, *1st trit. one dose daily, six days*).

196. A dull heavy pain in right side of chest through to the back, continuing and passing off at intervals of twenty minutes; and in the middle of the day a sharp shooting in left side of chest: all went off in the evening, second day. Next morning the same pain, but less violent. On the third day, aching at right hip-joint; stitch from hip to sacrum; a sensation of stiffness in the back of the neck when bending down the head. Rheumatic pain in shoulder and elbow-joint on motion, with numbness from shoulder to elbow (*M. J.*, 10 *gtt. 1st dil.*).

197. On waking, and also after rising, single short twitches in the extremities, chiefly in front towards the hands and feet, which soon passed off, and were followed by a pressing pain in the pectoral muscles under both axillæ, which also lasted but a short time (*Zlat.*, *1st trit. three days*).

198. Sharp pain in the right knee- and hip-joints, and left breast and shoulder first day. Next day sharp pain in knee. Third day.—Rheumatic pains in knees and chest. Fifth day.—In knee and hip-joint, and finger-joints. On the sixth, in the evening an acute twinging pain in the ball of left great toe, lasting four minutes; pricking and stinging pains in different parts of the body; acute gouty pain in ball of right great toe, precisely like that in left foot, and succeeding the other after an interval of four or five minutes (*Nn.*, $\frac{1}{50}$th *gr. several times a day for six days*).

199. Aching and jerking pains in the hip, felt only in the day. In the morning, shooting and pricking pains in all the limbs; he is stiff all over and can hardly move (*Hwe. Ch. W.*).

200. On the thirteenth, in the morning on awaking, and after rising he felt a pain in the coccyx (steissbein), deep as if in the bone, worse from walking and touch. This continued in all, more or less daily, for about four weeks, generally felt only in the morning, but at times lasting the whole day, or coming back in the afternoon and evening. Thirty-third.—The pain in coccyx came on again about noon, and was very severe when he got up to pass urine; it reached then to the urethra, and forced him to bend the belly forwards; it went off in half an hour. On the thirty-seventh it was felt during coition. Forty-fourth.—At noon, while sitting, again that peculiar pain in the sacrum (kreutzbein), as if he had got a smart blow on it. It went off in half an hour, and then he had tearing and drawing pains in the muscles of the front of right thigh. Forty-five.—Again the pains in sacrum coming on in paroxysms in walking, so violent that walking was hindered for a few moments at a time, going off next moment, though felt in the act of sitting down. In the afternoon they went off quite, and instead he had drawing pains in the right leg till evening. Forty-sixth.—On awaking, pretty severe pains in sacrum, which returned again later. He then had a pretty copious stool, after which the pains went quite off, but came back again after dinner slightly, and returned again for several days, but not so severe again. Besides these, he had pains, chiefly after the third week, in the bones at various times; gnawing pains in the malar bone, and in the bones of the extremities; pain like a bruise in the bones of the

face, especially on the facial surface of the upper maxillary bones. On the thirty-ninth day he had stitches in the inner surface of the sternum. He felt occasional returns of these pains till nearly a month after the last dose (*Zlat.*, $\frac{1}{10}$*th gr. every four days, for eight weeks*).

201. On the ninth and tenth days, on awaking he had pressing pain, especially in the occiput and forehead, which caused the sleep to be restless; also tearing and drawing pain in the right temporal muscle, which continued till the eleventh day. These symptoms came on in paroxysms, and for the most part were more severe before noon than in the evening. For some days before, he had pains in the wrists, and violent flying stitches in the large pectoral muscles and in the intercostals. Also a tensive pain in the sartorius muscle, which came on suddenly and hindered walking (*Lack.*, *1st trit. fourteen days*).

202. Second day.—Expansive pressure at zygomatic process of left temporal bone, in the afternoon. On the third, tearing and squeezing over the external malleolus of left foot, as if in the tibia (?), along with squeezing and tearing above the left wrist. On the fourth day (no medicine for two days), severe cutting pain along the right parietal bone (*Muller*, *1st trit. one dose daily for two days*).

203. Three hours after taking the medicine there occurred regularly every day drawing pains; on the first day in the left shoulder-blade, in the left upper and forearm, hand, and especially the thumb, which quite disappeared on moving the arm, and occupied more the bones than the joints; pressing pain in the whole right side of the head, especially, and most violent, in the occipital part of this side, accompanied by fleeting but violent stitches therein. On the second, drawing tearing pain in the lower limbs, especially in the right big toe; jerking in the little finger of left hand; tearing pain on the slightest movement of nape of neck; stiffness of the same.

204. On the fifth, slight tearing pain in left side of face, and at times (tenth) in the bones of the head. Sixth.—External drawing pain in the left temple, as if in the fascial covering of the muscle. Seventh.—In the evening, lancinating pains on the right side of the head, in distinct paroxysms lasting only a short time. Sudden stitches like needles thrust into the bones of the skull. Tenth.—About noon, constricting pain in the top of the head, and later paralytic drawing in the right shoulder. Thirteenth.—In waking slight drawing pain behind the left ear and left lower jaw. The movement of the head is not quite free; the muscles of the neck on the left side appear to be stretched. After breakfast feeling of pressure in the bones of the upper jaw, immediately below the orbits. The same in the afternoon of the twenty-first. Eighteenth.—Several times in the day a sharp pain in the infraorbital edges of both malar bones, and sensitiveness of the bones of the face. Fifteenth.—The whole evening a pain composed of pressure and shooting on a spot the size of half-a-crown, in the region of the seventh rib of the left side, like a pain in the costal pleura. Next morning on waking, the same pain, and the spot was sore to touch: in the forenoon, the shooting in it came frequently.

Next day quite gone. Nineteenth.—On waking, painful cutting and tearing in whole left side of the breast, seemingly superficial. Sixth.—A transient stitch through the abdomen backwards towards the spinal column; in the evening in walking, tensive pain in the left breast, more externally. Twenty-second.—In the evening on sitting down, after strong exercise, he felt a peculiar undulating contraction of the muscles of the back on the right side lasting a quarter of an hour. Though he slept well he had the feeling of insufficient sleep on getting up. First.—On waking, drawing pains in various parts of the body; but everywhere near the bone, and as if the periosteum and the tendinous expansion lying next it were affected. On rising very troublesome, drawing, and pressing pains in various parts of the body, especially in the bones of the face; but also in the long bones of the extremities. Twelfth.—In waking, tearing drawing pains here and there in the body, mostly in the extremities, yet also on the front of the chest and between the shoulders. Fourteenth and sixteenth.—Tearings in hands and feet and forearms. Fifteenth.—On awaking, tearing pain in the right tibia and ulna, afterwards burning on the outer surface of the left thigh. Eighteenth.—On waking from good sleep, very sharp tearing pains in the legs and feet, and forearms and hands. These pains were peculiar, they came in jerks, and were not extended, but it was always as if a single fibre or twig of nerve was suddenly pulled. They disappeared in an hour. Thirteenth.—On waking, slight pains in the fascia, now here, now there, in the neck, back, and extremities. Seventh.—Slight pressive pain in the left shoulder, which extended to the left breast; increased by moving the arm, particularly by raising it. Tearing pain in the right thumb, then in left upper arm, and then at the arch of the ribs on the left side. Eighth.—Tearing in the left forearm, and on the right side of the back of the head. Towards evening repeated stitches in the metacarpal joint of middle-finger of right hand. Besides these, on other days various less distinctly marked pains in the extremities, transient, and affecting different members simultaneously, or in quick succession (*Zl.*, *two provings*, *2nd trit. one dose daily*, *twenty-third and twenty-seventh days*).

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Cramps in various parts of the body, 96[19].
Periodic pains, 13, 13*a*, 203.
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Short twitches in hands and feet, 197.
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Characteristic Pains.

In short jerks, as if a nerve suddenly pulled, 204[41].

Pains *crosswise*.
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— left forearm and right side of occiput, 204[49].
— right knee and hip, and left breast and shoulder, 198.
— right axilla and left thigh, 176.
— right big toe and left little finger, 203.
— right forearm and left elbow, 175.
— right foot, ankle, shin, and left hip, arm, and shoulder, 11*a*.
Pains in up. and lo. extrs. at same time, 193[1], 197, 198, 204[33].

Pains in r. big toe and thumb, 193[3].
— malleolus and wrist, 202.
— back of hands and feet, 175*a*.
— hand and ankles, 175*a*.
Wrists, pectoral muscles, and intercostals, 201.
Drawing from back into arms and thighs, 162*a*.
Shifting pains, 193[7], 204[34].
— from sacrum to right thigh, 200.
— „ one arm to the other, 173.
— „ right thumb to left arm, and then left ribs, 204[47].
— „ left to right great toe, 198.
— „ left scapula to the toe, 162.
— „ vertex to loins, 164.
— „ right shoulder to left elbow, 128.
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Morning, pain all over, 199.
— on awaking, 204[34].
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Long bones of extremities, 204[38].
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— face and extremities, 200[23].
— sternum, 200[26].
— coccyx and sacrum, 163, 200[2].
— zygoma and parietal, 202.
— upper extremities, &c., 203.
— head, 204[6].
— face, 204[32], 200[23], 12.
— malar bone, 200[20].

Skin and Ulcers.

205. Brown spots on the throat, like freckles, on the seventh and seventeenth. On the eighteenth, itching and burning of the scalp, and on forehead, with eruption of small pimples here and there. Twenty-third, in the forenoon, while in the open air, severe burning in the face, below the eyes, and on both sides of the nose, as if he was going to have erysipelas. In the evening, burning of the same and forehead and right thigh. Thirtieth, burning of forehead, stopped feeling of ears, and burning in concha. Thirty-second, burning in skin of outside of the leg, in the evening (*Two provers, Zl. and Lackner, eight weeks and two weeks*).

205*a*. Painful inflamed papules on side of nose (*Zl.*).

206. On the tenth day, soon after awaking, he had severe itching in the skin of the neck. After a little time this disappeared; yet soon reappeared, first on the left shoulder, later on the left upper arm, and on the left side of the chest, and finally on the back. This continued from six to ten o'clock, and after midday the same itching appeared on the skin of the loins and quickly disappeared (*Lack., 2nd trit. eleven days*).

207. Sixteenth day, two vesicles on the under lip. On the succeeding days, on different parts of the face and body, burning and itching, and burning and itching in the eyes (*Zl., 1st trit. twenty-three days*).

208. Ninth, a blister full of serum in sole of right foot from walking,

which never happened before. Ninth and seventeenth, a few inflamed pimples on the back (*Zl.*, *2nd trit.*).

209. On the right side of the back, near the last rib, a boil formed, painful on the least motion, and lasted five days (*R.*, *1st trit. gr.* 15).

210. On the night of the second, he had considerable itching of the hairy parts of the genitals; it increased to inflammation of the skin and formation of about twenty pustules the size of pinheads, which were clustered together in the space of a square inch. Next (third) day it continued all day very troublesome, causing him to scratch constantly. Fourth and fifth, the pustules form little ulcers and run together into one, which discharges matter, and severe shootings in it, waking him at night. Healed up in five or six days. (*R.*, *2nd trit. one dose daily for five days*).

211. On the sixth day, a red pimple appeared on the back of the hand (*Dgn.*, *s. d. five days*).

Among the Workmen.

212. Papular eruptions on forearms, lasting a few days, recurring frequently (*Swny.*).

213. Three months after exposure, papular rash lasting three months (*Hrl.*).

214. After nine days' exposure to the dust of the K.-bich., he had an itching papular eruption on the forearm and legs, which lasted a fortnight, disappearing after he gave up the occupation (*Ch. W.*).

214*a*. Papular and eczematous eruptions.

215. Solid eruption like measles, over the body (*M. Ch. W.*).

216. Eruption generally comes on in the first fourteen days.

217. Rash commencing in hot weather.

218. Rash lasted only three days (*Hgn*).

219. In seven days vesicular eruption on a red and elevated base (itching and burning much, especially when exposed to steam), in a few days becoming pustular, and in some presenting a dark point in the centre —invading hands, arms, face, back, and belly. On the belly, near the umbilicus, some spots evidently of abraded vesicles, presenting a deep hollowed appearance, which remains after they are healed (*Mcl.*).

220. Pustules on the arm, the size of a split pea, with a hair in the centre (*L. Ch. W.*).

221. Eruption over the whole body of pustules the size of peas, with a small black slough in the centre on an inflamed base (*Hwe. Ch. W.*).

222. Small pustules all over the body, like the smallpox, which disappear without bursting (*M. Ch. W.*).

223. In a few days an eruption of red round spots broke out on the back, arms, and belly; the spots then formed pustules the size of a pea, covered with a scab which came off in a few days and left a small dry ulcer, which mostly healed up in about a fortnight leaving a colourless depressed cicatrix. After three months there still

remained an irregular ulcer, twice the size of a bean, with a scab, on the left scapula, quite out of the reach of contact of the solution. It is dry and superficial (*Ch. W.*).

224. Eruption on the face like smallpox for some weeks on first entering the works (*Brrt. Ch. W.*).

225. The face is covered with a profuse eruption like acne (1 *Ch. W.*, *aged* 35). [Other parts equally exposed are not so affected].

225*a*. He became covered on his whole body and face with pimples (boutons) which were thought to be syphilitic (*Del. and Hil.*).

226. During the first week a profuse yellow scabby eruption formed over the upper lip (1 *Ch. W.*).

227. Small yellow pustules on the calf of the leg, about the size of a split pea, not unlike smallpox pustules (1 *Ch. W.*).

228. Small pustules made their appearance at the roots of the nails on both hands, extended over the back of the hand to the wrist, and also, but slightly, on the palm; the arm became red, inflamed, and very painful, as far as the shoulder, the glands of the axilla suppurated, but did not break. The pustule on the hand was small and round, and secreted a limpid, watery matter, when the head of it was broken off; but if left alone the secretion consolidated into a yellow, viscid mass (*Hvy.*, *after three days' exposure to the solution*). Painful ulcer under the thumbnail (*McG. Ch. Sol.*).

229. Violent itching of the skin all over the body; then eruption of small pustules forming scabs, most on the arms and legs; the scabs are then painful, smarting and burning (2 *Ch. W.*).

230. Itching in the legs, followed next day by breaking out of a red eruption, which run together and formed scabs, discharging thin matter with aching smarting pains. It has lasted above a year, and is in large pustules on the front of the leg; better in cold weather (1 *Ch. W.*).

231. Heat and itching of the skin at night in the warmth of the bed, followed by eruption on the thighs and legs of reddish hard knots, from the size of a pin's head to that of a split pea, with a depressed dark scurf in the centre, surrounded with an inflamed base; declining in two or three days. Similar attacks recurred frequently (*Cpr. Ch. W.*).

232. After a week's exposure to the chrome solution (without any abrasion) there appears a small red elevation with a dark centre and elevated circumference, itching and slightly painful (*Crn.*).

233. Inflammation of the feet, and in twenty-four hours breaking-out of numerous ulcers (fourteen on one foot, and nineteen on the other) of the characteristic form; they healed in a fortnight (*Holn.*, *after standing for half an hour in a weak solution of the K. bich. with shoes not water-tight*).

234. Without his being aware of any scratch, the arm swelled as high as the axilla, then a *boil-like* elevation formed, which turned into a large ulcer with dark centre and overhanging edges (*Mty.*).

235. Redness, swelling, and itching in a spot on the wrist, then great pain; after some time, matter formed and broke the skin, and continued to ooze out for two or three months, then healed, leaving a

cicatrix depressed, as if scooped out (*Mcl., exposed to ch. sol. after some months*).

236. Itchiness of the forearms and hands, then intolerable pain and formation of numerous ulcers, from which above a dozen nearly solid masses of matter fell on striking the arm firmly. The ulcers were left clean dry cavities, which gradually filled up and healed in about a month, leaving a white cicatrix (*Ghm., four days after exposure to ch. sol.*).

237. In the seat of a scratch exposed to ch. sol. swelling and irregular ulcer, covered with a scab, painful on pressure, dry; this continued for months, and a hard knot, moveable, is felt under the skin, with an ulcerated spot like a corn. This gradually hardens, and is covered with a white skin and remains so for months (*Brd. Ins.*).

237*a*. An induration the size of a fourpenny-piece on the radial edge of the forefinger, much swollen in the centre, at the summit of which exists a fistulous perforation discharging a sero-purulent liquid; it resembles an ulcerated syphilitic tubercle (*Del. and Hil.*).

237*b*. On three fingers ulcers of ·015 millimetre in diameter, round, grey at the bottom, and covered with sanious pus; borders excavated and livid red, projecting, callous, hard and painful to touch, forming a mobile tuberculous plaque on the subjacent tissues (*Del. and Hil.*).

237*c*. On the little finger a large red tubercle, ulcerated and painful to pressure, which had lasted four months (*Del. and Hil.*).

238. After swelling and redness of the finger with severe throbbing pain, an ulcer formed over the joint of the forefinger with white overhanging edges and dark gangrenous central point; the skin and cellular tissue moveable as if separated from their attachments (*Crn.*).

239. The ulcers are always formed where any abrasion exists in parts exposed to the chromic solution, and frequently without any perceptible abrasion.

240. The ulcers vary in size from that of a pea to that of half-a-crown, they are generally dry, of an oval form, with overhanging edges, inflamed bright red areola, hardened base moveable on the subjacent tissues, with a blackish spot in the centre.

241. Sores in the parts exposed to the solution, which gradually pierced deeper and deeper without extending laterally till they sometimes made their way through the hand or arm altogether (*Cm.*).

242. In some persons, though exposed to the dust, abrasions did not lead to the formation of sores.

243. The ulcers were painful in cold weather (*M'G., Aln. Nvn.*).

244. Ulcer painful on touch (*Crn.*).

245. Ulceration of forefinger to such an extent that the two last phalanges had to be cut off (*Brn.*).

246. Elevated painless induration, where an ulcer was four months before (*Mfe.*).

247. Hands completely covered with depressed cicatrices, which look as if they had been punched out with a wadding cutter (*Mlm.*).

248. Sloughs on the fingers and glans penis from exposure to solution (*Cumin*).

248*a*. Round ulcers with raised border on fingers. They are as if punched out with a red spongy substance at the base (*Del. and Hil.*).

Summary.

248*b*. The ulcers begin with a sharp persistent pain increasing rapidly, worse in the cold of winter, when it even extorts cries; a slight excoriation first appears at the painful part, and in the next and following days the environ becomes red, thick, and swollen, then a central eschar forms which spreads in depth rather than in circumference, and thus may penetrate to the bone. Fully formed they show at the bottom and in the middle a reddish, fleshy, regularly-shaped body, soft and spongy, isolated all round and attached to the bottom by a narrow base. They discharge a sero-purulent fluid like that of fistulous openings. The borders become fallen in and smooth and partially cicatrised. Finally they cicatrise from circumference to centre, leaving a depressed, dead-white cicatrix (*Del. and Hil.*).

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Commentary.

The idiopathic and peculiar action on the skin is well marked. On the provers we have as many indications of it as usually appear in such experiments. In the workmen it appears fully developed, probably from the different channels through which it is introduced into the system, and thus penetrates it more completely; but certainly not from mere local irritation, because, as many of the cases well show, there was a simultaneous eruption all over the body, or in parts that were not touched by the salt. (See Ss. 38, 219, 221, &c.) In animals a scaly eruption spread over the body, and the inner surface of the skin was injected in several cases, in another gritty granules and induration, in another a thickening almost cartilaginous. The hair became staring and lost its brilliancy. The resemblance to syphilis was noted in certain forms, *e.g.* 225*a*, 237*a*, and other pustules healing with a depressed cicatrix.

Therapeutics.

The success of this remedy in skin diseases confirms the induction from the proving that the action on the skin was specific and constitutional and not merely that of a topical irritant. In eczema, besides Case 99, I have had frequent experience of its utility, at times using it also locally in the strength of a quarter of a grain to the ounce of water, or weaker; also one grain of the neutral chromate to the ounce of water; also a very weak solution of chromic acid is in some cases better, one grain to eight or ten ounces. I cannot give any very definite clinical indications for the choice of K-bi. in that capricious and often intractable disease.

It is more decidedly indicated and successful in pustular diseases. Cases 86 to 91 are chronic pustular diseases cured by internal use alone of our remedy. In one itching pustules formed on the face, with watery pus, and leaving a brownish scab; in another greenish crusts spreading over half the head from the ear, with whitish thick oozing; in another, of a man aged 48, there were detached pustules from the size of a pea to a sixpence, with a red base and covered with a brown scab, all over the body. In a syphilitic subject thick brown scabs, under which yellow matter formed, on face were removed by K-bi. 6, 3, and 1.

Again, it has proved curative in small painful boils.

Case 95.—*Peculiar pustular eruption.*—A man, aged 46, had had for seven years an eruption all over the body of the following description: First a small lump comes on in the skin; then it inflames and gets red; then discharges a bloody fluid, and leaves a small, depressed, ulcerative surface with an inflamed base, which heals and breaks out again. Wherever the discharge touches it causes a fresh spot. It itches violently at night. General health good. Cured in ten weeks given in different dilutions, and finally in the 1st.

Case 96.—*Porrigo.*—A boy, aged 2, had for four months an eruption of small yellow round pustules, with a rather depressed scab, running together and oozing

yellow matter; he had also scrofulous ophthalmia, with a pustule on the cornea and photophobia. The head and eyes were quite cured in two months with K. bich. 3 and 6 ter die with the interposition of Belladonna, 6 ter. die, for several days every now and then. A remaining moist eruption of the ears was removed by Hepar.

A case of chronic papular eruption like measles is reported. It was accompanied with intense burning itching, especially at night, so that she has had to walk about the room most of the night at times. Syphilis not ascertained, but she had been treated with mercurial pills without benefit. K-bi. 1 removed the disease.

Lupoid.—In October, 1875, I saw a middle-aged female with a lupoid eruption at the inner canthus of the right eye, extending down half the length of the nose and part of the cheek; it was ulcerated at the edges and covered at the centre with a hard scab which could not be detached. It was extending, and had lasted for seven years. Health otherwise good. K-bi. 3 was given internally and the part painted every second night with a solution of one grain of pure K-bi. in ʒij of glycerine. In five weeks the edges showed a healed white cicatrix and the scab was nearly gone. The glycerate did not smart much. The patient did not return.

Lupus.—A man, aged 54, had for ten years a sore on left cheek the size of an almond; base clean and raw, and discharging much clear watery fluid, very hot and scalding, no pain. K-bi. 3 night and morning, and a lotion of a quarter of a grain to one ounce applied to the sore for an hour night and morning. Two or three days after the sore became very painful and swelled, involving the eyelids so that the eye was closed. The wash was omitted and the K-bi. continued inwardly at intervals and in the third and sixth dilutions at different times up till the end of ten weeks, when the sore was quite healed with a firm, painless, depressed cicatrix.

In Case 100 lupus in the face was apparently arrested by K-bi. in different dilutions given uninterruptedly for nine months.

Dr. E. Blake pointed out the great similarity of the K-bi. pustules and ulcers to the course of lupus non-exedens, and gives two cases of complete cure under its use. The first, a woman of 60, had it on the side of the nose for twenty years; much itching of the sore. K-bi. 3ˣ inwardly, and at first a lotion of gr. 30 to ʒiv aquæ; this causing much burning was diluted to one tenth of the strength; cure in five months. The second, a woman of 48, also nasal lupus. K-bi. 3ˣ bis die for fourteen days with slight benefit, then 5ˣ with more marked benefit and steady progress for four weeks, then K-bi. 3ˣ with return of the pain, so K-bi. 5ˣ was continued till the end of the treatment of four months more, when the cure was complete. The drug was not used externally.—*B. J. of Hom.*, 32, p. 646.

Ulcers.

We have used this medicine to a great extent in the Liverpool Homœopathic Dispensary, and on the whole obtained as much success as can be hoped for from any single remedy, and cured some cases as

extensive as we could suppose the cure attainable, without the comforts of hospital accommodation, which is indispensable, as is well known, in many cases of ulcer of the lower extremities. We have used it at the same time externally in a considerable number of cases, but not by any means in all. When used externally it must be much diluted, as even the strength of the first dilution gives rise to violent pain, as was also found by Dr. Watzke, of Vienna. We have gradually diminished the strength of the common lotion used at the dispensary, and the strength now recommended is a quarter of a grain of the pure salt to the ounce of water; this is about half the strength of the third decimal dilution. It would be tedious to narrate any considerable number of cases. We may shortly notice that it seemed most useful in those cases where there was much pain and irritation, and several small ulcers broke out simultaneously, or in quick succession; though it was also useful in many large ulcers when there was inflammation about them.

Several illustrative cases are given which need not be repeated, as nothing is added to the indications given in the proving. They were all painful except Case 105, which occurred in a syphilitic subject of 22 who had had primary syphilis two years before. Here there were numerous small irregular ulcers on the leg having a depressed cicatrix. K-bi. 3 bis die effected a cure in a month without any external treatment.

Dr. Kitchen says: "In ulcers, especially on the legs of old persons, which appear to be gouged out and covered with yellow matter, this remedy has proved beneficial used internally and locally by the application of lint saturated with a weak solution."

GENERAL DEBILITY AND WEAKNESS, &c.

249. After the usual local symptoms in the mouth, he had in half an hour, while walking in the open air, unusual weariness, heaviness of the limbs, exhaustion, indifferent and depressed in spirits, and unfit for work; he feels exhausted with heat, as if after great muscular efforts; he is tired with walking a short way and is obliged to sit down, and he cannot well collect his thoughts; he wishes to be alone and in the open air. Nevertheless in going his round of visits on the sight of food he is seized with craving appetite [unusual at that hour], and on eating he feels better, but in half an hour has cold and horripilation, especially on the extremities, alternating with flushes of heat and general sweat; nausea, eructations, flow of water, and inclination to vomit. These subsided in an hour or two (*Schwartz, gr.* $\frac{1}{3}$, *one dose*).

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Weariness and exhaustion, 80*a*, 83 (im. eff.), weakness so that he trembled on attempting to rise, 162 (fatal).
Disinclination for exertion, 98, 129[21], (abd.).
Weakness and prostration, 3 (vertigo), 11 (headache), 152 (cough, &c.), 160[15].
Tottering gait, 11 (headache).
General uneasiness or discomfort, 101, 119, 105*a*, 132[11] (abd.).
Exhaustion, 77*a* (throat).

Remarks.—General debility, weariness and weakness of the limbs are a prominent accompaniment of many symptoms, and often seem out of proportion to the primary symptoms.

Index to Fever.

Febrile paroxysm night and morning, 159 (chest).
Feverishness in the first part of the night, 106.
Shuddering and chilliness, 83, 99, 101.
— inward, 92^{11}.
Heat all over, 84 (im. eff.).
— at night, 103 (gastr.).
Heat all over, with inward cold, 92^{20}, 94.
Heat of hands and feet, 88.
— face and upper part of the body, 92^{10}.
Skin hot and dry, 96^{30} (gastro-enteritis).
Flushes alternately with shuddering, 93.
Sweating, 92^{12}, 99.
Sweating on the back, 93.
— during effort at stool, 127.
Pulse small, 171^{10} (renal).
Pulse at first feeble, then hard and full, 120. Then 100 and jerking, 96^{28} (gastro-ent.).
Blood buffed and cupped, 96^{24}.
Fever with bronchitis in a horse, 160*a*.

Sleep, &c.

250. On the twenty-first day he had a quite peculiar unpleasant feeling at four o'clock in the morning, which might be best described as a nightmare. He dreamed that somebody had laid himself across his breast and belly, which so hampered his breathing that he thought he would choke, called out aloud, and on waking was covered with sweat, and with his blood in great commotion. After rising felt rather fatigued (*Zlat., gr.* $\frac{1}{10}$*th every four days for eight weeks*).

251. On the first, at midnight, awoke with an oppression on the chest, hitherto never experienced, which took away his breath and was very highly oppressive (like what he had imagined the nightmare to be). Second day.—Sleepiness towards evening; at midnight was again awakened by a violent oppression on the chest, as if a hundredweight lay on it, and could not fall asleep again till dawn (*Mz., gr.* $\frac{1}{10}$*th daily for six days*).

251*a*. Sleepiness and prostration, so that he could hardly write. Was awakened in the evening sleep by jerking of whole body or single muscles. Awakens early with salt taste (*Zl.*).

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Sleepiness, 5*a*, 86 (im. eff.), 251*a*.
— and yawning, 105*a*.
— early in the evening, 119, 251.
Restless sleep, 85, 86 (im. eff.), 171^{15} (abd.)
— unrefreshing, 135^{10}.
— starting, tossing, and talking, 129^{22}.
Snoring, 129^{23}.
Unrefreshed feel after good sleep, 193 (general pains), 204^{28}.
Awaking with jerks, 251*a*.
Nightmare, 250, 251.

Remarks.—There seems to be no idiopathic action on sleep, and even the sympathetic action is rare and not great; it is often remarked that the sleep was good, even when symptoms of considerable intensity were present during the day.

General Nutrition.

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Emaciation, 137[27], 160[15] (cough, &c.), 96[48], 77*a*.
Dyspepsia, 96[48] (gastro-enteritis).
Cachexia, 158 (cough, &c.).
Anæmia, 77*a* (throat), 158 (chest).
Feeling of an acrid humour or psoric diathesis, 127[3] (abd.).
Feels very ill, but cannot tell what, 131.
Feeling as if he were going to have a severe illness, 99.

251*b*. I may conclude by noting a few general remarks that were made by the provers or on the workmen. The after-effects of the proving experienced by Arn. are given at No. 118. Those of Zlat. are given in a note in the following words:—

"The Bichromas Kali displayed itself to me as a medicine that expresses its action more in the vegetative than the sensitive sphere; and which more especially attacks the bones and their immediate coverings, as well as the mucous membrane and the fibrous tissues. It showed a quite peculiar operation on the nose, both on the schneiderian membrane and the bones of the nose; then on the long bones of the extremities, on the sacrum and coccyx; in a slighter degree also on the sternum. The bones of the organ of hearing were also not quite unaffected. [The character of the pains is given at 204[40].]

"I would have no hesitation in counting it among the antipsoric medicines, and ascribing to it a long duration of action. I can assert that even a month after the last dose I took, the action of the medicine was not finished. [See 200.] It seems in many respects to be analogous to arsenic, and may, in all probability, be administered in diseases with advantage in very high potencies."

Mz. adds the following "concluding remarks:" "I was compelled to give up my experiments on account of the greatly deteriorated state of general health brought on by them. For three weeks after I continued far from well. During that time I had frequent returns of the eructations, nausea, inclination to vomit, want of appetite, and troublesome griping in the abdomen. And I was troubled daily, and almost constantly, with dull aching and cracking in different joints; smarting and watering in the eyes; tickling and burning in the nose; pressive aching in the head and cardia; earthy and yellow complexion; general emaciation; considerable falling out of hair. As regards the bowels, I had, with few exceptions, daily two motions; the first regular and consistent, and soon after it a loose one. I did not regain my former good health till the fourth week after these experiments."

The writer also was powerfully affected by the drug, and the general health considerably deteriorated for a time; so that some time after the actual distinct symptoms of the drug had subsided, he had a return of a species of severe nervous or bilious headache, which he had had before, but not within two years.

The general impression from an examination of men engaged in the manufacture of bichromate of potash, on whom it has produced its peculiar effects, is, that they suffer from dyspepsia; and though the

appetite is generally good, yet many become anæmic, the skin acquiring a yellowish hue, which affects even the conjunctiva. In at least two thirds of them the *septum narium* was perforated more or less. In three fourths of them the fauces and soft palate were red and injected, although without pain or soreness. In two cases deep ulcers on the palate, but without pain. The pain mostly complained of was across the loins; catarrh (chronic) existed in about 25 per cent. of the cases, attended with an expectoration of tough viscid tenacious mucus, generally white, but sometimes dark grey, approaching to black.

Delpech and Hillairet's Summary of the Effects on the Workmen.

From the description of the processes for making bichromate it is obvious that by far the greater part of the effects must be from the action of chrome in the form of bichromate, much less as chromate, and hardly any possibility of chromic acid. The dust of the chromate of iron is innocuous. Among the well-established effects, the perforation of the nasal septum, and the ulcerations of hands and feet and exposed or previously wounded parts were universal; bronchial attacks, headache, and sorethroat less common.

252. Ætiological Conditions and General Characteristics.

Transient flying pains all over. Rheumatic-like, and shooting and pricking pains here and there all over.

The rheumatic pains are aggravated, and the gastric relieved after eating (109, 135).

In general where the gastric symptoms are very prominent the rheumatic symptoms do not appear.

Many pains are worst in the morning on awaking (197, 204[39]).

The pains all over seem worst in the morning on awaking.

Pains, which migrate quickly from one part to another.

Several of the workmen stated that the cough and expectoration were worse after the use of coffee, and they gave it up for tea.

Fat and light-haired persons seem more easily affected by this drug.

The open air, when moderately cold, affects him painfully (*Zl.*). Chilliness.

Some of the symptoms in the workmen are increased in warm weather.

Some symptoms are periodic, returning at the same hour daily, or at longer intervals (88, 149*f*, 8).

General Physiological Action.

Güntz considers, in the general action on the system, that chrome resembles iron and manganese; the form in which it enters the blood

is not known, nor how it is eliminated. He analysed the urine frequently without finding it therein. In one patient, who had taken in all about 2 grammes of Kali bich. in thirty days, no trace was found in the urine. Also in a patient who had taken 0·06 grammes of K. bich. daily for a long time, 420 grammes of blood were drawn, and on analysis show no trace of chrome.

Commentary on the General Action.

This substance may be classed as a pure irritant to the organic tissues. Its action is of a profound and intense character, producing inflammation which goes on to the formation of morbid products even in parts on which it acts only through absorption or by sympathy. The specific tendency of its action to certain organs and tissues is well marked and much more circumscribed than that of arsenic or mercury. Its influence is confined almost wholly to the tissues of organic or vegetative life, and is most marked on the mucous membranes of the stomach and bowels, and of the air passages and nose: next the eyes; then it effects, with about equal intensity, the skin, the liver, and the kidneys, and lastly the fibrous and muscular tissues and the periosteum, and probably the bones. It seems to have little or no specific relation to the serous membranes, to the genital organs of either sex, to the cerebro-spinal nervous system (except neuralgic affection of certain individual nerves), or to the mind.

Its action is rapid, and also long continued—even after the moderate doses of the provers its action could be traced beyond four weeks after the last dose was taken. When swallowed in dangerous doses, the effects have been known to last in a serious form for four months.

According to J. Priestley, "As is the case with many other irritant metallic poisons, its action may be regarded as twofold, viz. an action on the mucous membranes, and an action on the great nervous centres." The first is sufficiently obvious. But for the second he points out, 1st, phenomena of stimulation, and 2nd, those of depression of various cerebro-spinal centres. Of these the most important is the vaso-motor centre. "This centre is somewhat stimulated as soon as the poison has had time to circulate in the brain, the arterial tonus being considerably raised shortly after venous injection; but after a brief period of exaltation the power of the centre gradually declines; it loses its hold of the vessels which, as death approaches, are apparently dilated to the full." The cardiac inhibitory centre in the cord is also acted upon in an irregular manner. The motor centres of the cerebro-spinal system are manifestly acted upon, as is shown by the convulsions in guinea-pigs and rabbits and the abolition of reflex action in frogs.

Notwithstanding these considerations, I think we must still hesitate to give it any well-marked specific action on the cerebro-spinal nervous system, even on those lower centres intimately connected with organic life. For if we call to mind Priestley's own remarks given here under the commentary on the heart, we cannot but feel that the same objec-

tion applies to the greater part of the evidence for action on the cerebro-spinal centres, for the rapid and coarse lesions and changes in the blood may well call forth vaso-motor and reflex actions as the legitimate functions of these nerves without any specific independent influence on their centres. So probably we may look upon the cramps and convulsive movements before death and irregularity and weakness of the pulse, as well as the rapid sinking of strength and semi-paralysis of animals as the natural reflex of peripheral irritation and not an idiopathic action of the nerve centres. The signs of action on the brain and mind are also few or null, so this metal presents a great contrast to copper, zinc, silver, and others. We must, however, make an exception in favour of the trunk and peripheral expansions of certain sensiferous nerves, especially the supra-orbital branch of the fifth pair and of the cervical and dorsal spinal nerves which supply the back and chest where phenomena like angina pectoris are displayed ; also the sciatic nerves ; in all these a specific action seems obvious.

Therapeutic Commentary.

Vulpian has given the results of some empirical experiments with this medicine in affections of the nervous centres. He gave it in several cases of *tabes dorsalis* which had been under treatment with iodide of potassium or nitrate of silver with benefit for a time. Then, when no further progress took place, these medicines were omitted and K. bich. given for one or two months in pills containing each one centigramme ; of these the number was increased to nine in the day, three after each meal. As result, he says that in no case was the disease aggravated, while occasionally the amelioration which had been arrested before giving it, began anew in a more or less marked degree, but these were the exception rather than the rule.

After the mucous membrane and their appendages, the most important sphere of its action seems to be the fibrous tissue including the tendinous expansions, muscle sheaths, and periosteum ; there the action is strong and well marked, as shown in the section headed general pains, &c. The characters of the pains are associated in widely different parts, and as flying from one part to another remind us of rheumatism and gout, and the resemblance to the latter is strengthened by the frequent and very painful affection of the toes and fingers and the small joints. The periosteal pains, and even the presence of actual nodes, show the similarity of the action of this drug to rheumatic and even syphilitic periostitis and nodes.

Idiopathic fever is not displayed in the provings, but the presence of fever with high pulse and buffy coat of the blood in toxic cases where the gastro-enteritis is fully developed, show that it is fitted to cope with acute disease ; although we can hardly consider it the analogue of rheumatic fever, yet it may find a place as an intercurrent remedy, even in that, owing to the well-proved local action on the tissues mainly affected in that disease. It is to be regretted that we have

no direct observations, analytical or other, of its effects on the blood but the remarks on purpura in the therapeutic section would incline us to think there must be some idiopathic action on it. At any rate, whether direct or only by the action on the liver, spleen, and mesenteric glands and digestion in general, a profound general cachexia and anæmia is the consequence of its long-continued action as seen in the throat, Case 77*a*, and the concluding paragraphs of this proving. The analogy between the pathogenic action of this medicine and that of the syphilitic poison is given at p. 572.

Analogy with other medicines.—Hydrastis exhibits a remarkable analogy with K-bi. in its slight influence on the cerebro-spinal nervous system and strong action on the mucous membrane, the skin and general nutrition. The hydrastis alters the secretion of mucus in a similar manner, and finally induces inflammation, erosion, and ulceration.

General and Constitutional Therapeutic Action.

Rheumatism.—Experience has confirmed the indications of the pathogenesis in many varieties of this disease, chiefly the chronic form and when there is little swelling or, according to Hughes, the "cold" variety. Also in the tendinous expansions and the periosteum. And although it is not suitable for the highly inflammatory stage of rheumatic fever, I have found it useful in many cases of rheumatic fever when preceded by aconite, gelseminum, or cactus; or alternated with one of these, or given as an intercurrent remedy later on, according to the symptoms. The shifting pains are well marked and correspond to the symptoms in many cases of acute rheumatism.

Gout.—Here also the rapid shifting of the pains and the extremely acute pains in the small joints, combined with the numerous varieties of disorder of the digestive organs and of the liver and kidneys, point to K-bi. as a probable remedy. Experience again has not disappointed us, and I have found it useful in the acute form where the pain is more neuralgic than inflammatory and febrile and there is little swelling. Also when the pains shift and where there is weak and irregular action of the heart. In the chronic form it is not so good for removing the sequelæ in the form of swelling of the joints, as for counteracting the specific constitutional disorder of nutrition which the disposition to return of the paroxysms consists. Therefore I place it among the list of those medicines to be given in the intervals of comparative health for the purpose of eradicating the gouty habit. It is my practice as far as possible to induce patients after recovering from an acute attack of gout to keep under a course of specific medicines for months or even years besides prescribing the appropriate diet and regimen. No doubt people may say that if a patient gives up fermented liquors, uses moderation in diet, and takes plenty of exercise while he takes a course of medicine, it will be owing to the regimen and not the medicine if he gets rid of the disposition to gout. No doubt also many will say that, as people with insufficient experience will say anything, if only sceptical enough, about the virtue of medicines. But they would be wrong, for I have

seen cases in my own experience, and read of more, where the most rigid diet and even vegetarianism long persevered in has been inadequate to eradicate or even stave off for long the gouty attacks. Whereas I have seen this to happen after courses of medicines (with also, of course, observance of suitable regimen) continued for as long as possible after an acute attack. The chief medicines were veratrum, colchicum, pulsatilla, K-bi., the natural mineral waters of Bath, Vichy, Carlsbad, Wiesbaden, &c.

Neoplasms.—Here we may notice an obscure case of tumours in the abdomen and elsewhere, with profound alteration of the general health, all completely cured by the empirical use of the bichromate in the practice of Vulpian. Case 6 (of the series given in section, Stomach, p. 516). A woman of 35 was admitted into the Hotel Dieu, in Dec., 1881, with, it was supposed, cancer of the uterus. This diagnosis, it was soon found, was erroneous, and Vulpian states parenthetically that he has failed to obtain benefit from this medicine in that disease. In January, 1882, the patient was thin and so weak as to be confined to bed; complexion pale and cachectic; severe pains in the hypogaster and kidneys, and at pretty frequent intervals metrorrhagia. Early in February, 1882, she was attacked with pains in the left side of the head and neck and the left arm, with numbness of these parts; these pains were contusive; they became very acute for a few hours or a day or two, and then were moderated to dull pain. Thinking these symptoms depended on the formation of secondary tumours in the bones of the skull, or in the brain and its membranes, Vulpian prescribed "à titre d'essai," pills of 1 centigr. of bichromate, two, then four, then six a day. At the beginning of March, 1882, the situation was worse; no appetite, and more loss of strength, owing to the want of sufficient food taken; the pains in the head and left arm came in frequent paroxysms; aggravation of the pains in the hypogastrium and kidneys. On palpation of the abdomen there is now for the first time recognised a tumour, situated in the right side, above the Fallopian ligament, deep in the abdomen; it seemed to have the volume of a hen's egg, and its major axis transversal; it was a little mobile and painful on pressure. Another similar tumour is felt less distinctly above this, also deep seated and a little below the lower border of the liver. The metrorrhagia continues to recur. The six pills of bichromate daily were continued, and in addition an ointment of K. hyd. and belladonna rubbed on abdomen. About the beginning of May the health began to improve. The pains in the belly and kidneys became less violent and less frequent, as also those of the head and arm and the numbness. No return of metrorrhagia for a month. Only the inferior tumour in the abdomen could now be felt, and that was smaller and less painful. Appetite, digestion, complexion, and strength all improved. The amelioration went on steadily, the pains in head and arm and numbness of the latter subsided. The intra-abdominal tumour gradually grew smaller and disappeared; the catamenia became normal, and in June she was dismissed cured. After the hypothesis of cancer of the uterus followed by secondary tumour was found to be erroneous Vulpian admits that the diagnosis remains obscure, but he inclines to

the supposition that the tumours were sarcomatous. The question of syphilis seems not to have been considered.

General cachexia.—Though we have no evidence of the primary action of this medicine in causing a disordered condition of the blood, yet we may expect to find it useful where such a condition has ensued in consequence of long-standing disease of the liver and other important organs of the digestive system.

CASE 85.—*General Cachexia.*—Our remedy effected great amendment, though not complete cure, in the case of a man, aged 44, who had been for years ill. He had jaundiced, puffy countenance, with pale lips; tongue broad, cracked, and flabby; bad taste in the morning; his gums bleed at night, and he finds clotted blood in his mouth in the morning; constant thirst; appetite at times craving, at others none, with a faint nausea; after meals load at the stomach and dull pain, and nausea and empty retching; bowels rather loose with yellowish and slimy motions. He has a large, flabby ulcer on the leg, and the skin of the whole leg is thickened, hard, and pasty. Under K. bich. 3, 2 and 6, for several weeks, he improved very much; and the bowels and gums and digestive organs and general appearance became much better, and the leg grew softer. He was not, however, cured of the ulcer, nor do I think such a case could be cured without the comforts of an hospital.

Here we may notice the therapeutic action of K-bi. in purpura, "weed," and thick leg in horses, and also in farcy.

Purpura hæmorrhagica.—I have met with no case of this in the human subject, but Mr. James Moore, of London (*The Veterinarian*, June, 1873), reports a case of it in a horse after scarlatina. "The pulse was 50, soft, full, and compressible; the nasal membrane is quite black, the nose hard, swollen, and exquisitely painful; the swelling of the limbs, which reaches as high as the stifle-joints, where it terminates abruptly, is hard, tense, hot, and so tender that he will scarcely allow the parts to be touched; the fore-legs are also swollen, especially at the knees; the horse can hardly move himself, and has a dull, dejected look and eats little or nothing; bowels costive and urine scanty and high-coloured. To have K. bich. pure, one grain in 24 oz. of water, 2 oz for a dose every two hours. Next day marked improvement, patches of ecchymosis in the nasal membrane begin to slough off, less swelling and pain of muzzle; hard extravasation the size of a goose's egg on chest; medicine continued every three hours for two days; then three times a day for four days, by which time the sloughs had separated on nostrils and thighs, the swelling of legs subsided, the tumours on breast much diminished, and the general health restored." Several other cases are given, and some more severe in which the medicine was equally successful, and the author states that he is so satisfied that he never gives any other medicine in this disease. "'Weed' is another disease in which I have largely used this medicine with beneficial results. When there is much fever I usually begin with drop doses of the tincture of aconite repeated every three hours for a few times, followed by the bichromate, one grain in a wine-bottleful of water, of which solution a wineglassful is given three times a day. I have also the lotion rubbed in all over the affected limb and the enlarged lymphatic vessels when the activity of the inflammation is on wane." Mr. Moore thinks horses so treated are not subject to recurrence of this disease, and "that the bichromate in some way or other

fortifies the lymphatic system against the well-known tendency of 'weed' to reappear." In chronic thick leg or elephantiasis due to past attacks of weed he adopts the same remedy internally and externally with success. He finds it also curative in cellulitis of the legs of the horse which tend to suppuration in front of the shin-bone.

Mr. Clark reports speedy cure of "œdema" in horses with doses of $\frac{1}{6}$ gr. every two hours.—*Veterinarian*, June, 1873.

Mr. James Moore finds bichromate lotion the best application for capped hocks in the horse:

"The bichromate has a remarkable power over farcy, as I have seen shown over and over again. I do not refer to the acute form of this disease which breaks out suddenly and violently, corrupts the whole system, and rapidly runs a course which no medicine can control. But I will sketch the symptoms of such a case as I mean, and the treatment I employ, both founded on fact. My attention is called to a horse with swelling of the near hind leg from the fetlock up to the groin on the inner side; I find ten or twelve farcy buds up the course of the absorbents. They vary in size, all are painful, and a few have burst and are discharging unhealthy pus. There is a collection of matter as large as a saucer on the off side, over the ribs; this is opened and the pus let out. The submaxillary glands are tender and enlarged, especially on the left side, a thin mucous discharge flows from the nostrils, the nasal membrane is redder than usual, but no ulcers can be seen. The coat is harsh and dry, and the appetite poor. I give the bichromate in the usual doses three times a day, and cause the lotion to be rubbed in over the buds, the swollen glands, and the diffused swelling in the legs. The soft buds are lanced, also the submaxillary glands if they are suppurating. Sometimes I rub the finely powdered bichromate with the point of the finger into the opened buds, a slough is produced, and the sore heals up sound. The result of this treatment is that the swelling diminishes, the smaller buds disappear, the appetite and condition improve, the nasal discharge stops, the submaxillary glands resume their natural size, and the patient is cured in from two to three weeks. I have treated many cases with the same general features as this case, and the animals have returned to heavy work without suffering a relapse. I have also seen a good many cases where the buds were situated on one cheek from the angle of the mouth upwards, and backwards, and around the mouth, and openings of the nostrils, the submaxillary gland being enlarged, and its duct thickened." —Jas. Moore, *Veterinarian*, June, 1873.

Syphilis.—The resemblance in many respects between the action of this medicine and that of the syphilitic virus, and also its analogy to mercury, would lead us to hope that we may find in it another remedy for that disease. Though we would not place any weight on such a merely superficial resemblance, yet we cannot refrain from noticing the likeness that the chrome ulcer when healed presents to the indurated chancre. A more correct way of judging of the resemblance is in the further development of the constitutional symptoms. We have in this remedy the rash on the skin; then the sorethroat, which has been mistaken for syphilitic; then the periosteal pains; then the rheu-

matism; and lastly, the diseases of the skin, chiefly of the pustular character, which have the hard dark scab, and leave the depressed cicatrix. These circumstances lead us to hope for much success in syphilitic and mercurio-syphilitic diseases.

Experience, as far as it goes, has confirmed the above anticipation, written in 1843, although as yet this medicine has not been so extensively used in this disease as it deserves in the school which follows the rational indications of the homœopathic law. Cases of cure in the eyes, nose, and throat, and also in the skin have already been given. I have also reported two cases of cure of syphilitic periostitis by the neutral chromate in doses of 1 gr. of 1st decimal trituration twice or thrice a day (*Brit. Journ. of Hom.*, xv, p. 679). I have also used it with benefit in numerous cases of skin eruptions, periosteal, and rheumatic diseases with a syphilitic taint, as part of the treatment when indicated by the pure symptoms. Liedbeck reports a case of inveterate syphilis which had been treated allopathically and hydropathically for years, and also undergone syphilization with but slight and transient results. This was cured in a surprisingly short time with K-bi., 2nd dil,, night and morning (*Brit. Journ. of Hom.*, xv, p. 498). A case of infantile syphilis, cured in 1849, is given at p. 27.

Since the above proving was published by myself and the Austrian Proving Society, this medicine has been used empirically, or at least without acknowledgment of the priority of its use in the homœopathic school, by Puche in 1850 for mucous plaques, by Heyfelder in 1852 for syphilitic ulcers in the throat, of which three cases were cured in a month with doses of grain 0·18 twice or thrice a day, but it failed in one case of phagedenic ulcers of vagina, two of lupus, and one of icthyosis and one of psoriasis. Boeck in 1852 tried it without good effect in "several cases of syphilis" in doses of one third to two thirds of a grain, which produced, as we might expect, vomiting, pains in stomach, &c. Dolbeau in 1865 and 1867 tried it extensively in L'Ourcine; he reports four cases of chancre followed by secondaries completely cured with pills of K-bi. (dose not given). In one ward he treated eighty women with mercury, of which forty-four relapsed and fifty-one with K. bich., of which thirty relapsed; he concluded that it was not an infallible remedy, but that it was at least harmless, which cannot be said of mercury. In 1868 Dr. J. E. Güntz began the use of it, and has recorded his experience at different times, and finally published them complete in his work, *Die Chromwasser-Behandlung der Syphilis* (Leipzig, 1883, Arnold, 8vo., pp 358), a very elaborate work, from which I will extract the practical points. In 1879 Dr. Rimon, of Seville, published his experience, and in 1872 Dr. Gossmann, of Munich, following the example of Güntz, tried it in the doses recommended by the latter in 1869, viz. one tenth of a grain twice a day. In the first case, a girl of 18, with primary ulcers on labium and cervix uteri, condylomata, and swelling of inguinal and cervical glands, followed by roseola papulata. No local treatment except washing with water. In six days, the medicine being omitted for three days owing to gastric disorder and nausea, the condylomata were then drying and the rash paler. In ten days ulcers healed and the condylomata absorbing;

eleventh day, glands less swollen; on eighteenth day condylomata entirely gone; twenty-eighth day, desquamation and decline of the rash; fortieth day, glandular swelling subsided; complete disappearance of all the symptoms on fiftieth day. Eight similar cases are given. The author points out that no local treatment was used to the condylomata, which shows the specific action of the drug. He concludes that though not so quick as mercury it is a truly curative medicine in syphilis, and for safety is preferable to mercury.

In 1861 Jaillard reports cases of secondary syphilis treated with doses of 0·01 to 0·05 grm. in the *Gaz. Méd. de Strasburg*, but I have not been able to get access to this.

With respect to the doses and preparation of chrome, Dr. Güntz in 1869 found it necessary to give smaller doses than his (allopathic) predecessors, and then decided on giving K. bich. in pills containing 0·005 gramme twice a day immediately after meals, not on an empty stomach. This was continued for two to three months, omitting the pills for a few days now and then if gastric troubles supervened. Subsequently Güntz substituted natrum bichromicum for the potash salt in the idea that soda salts are better borne by the stomach. Next he added equal parts of nitrate of potash to the chrome salt and made the pills with bread in order to prevent decomposition of the chrome salts and render the mass more digestible. Finally he fell upon the plan of making an artificial mineral water with the chrome salt on the same principle as the effervescing chalybeate mineral waters. He has adhered to this for years, and finds it the safest and most pleasant mode of giving an anti-syphilitic course of medication under the name of "chrome-water." The method of its preparation is as follows:

Take of Kali bichromicum,	gramme	0·03
Kali nitricum	,,	0·1
Natrum nitricum	,,	0·1
Natrum chlorid	,,	0·2
Water	,,	600.

This must be incorporated at the highest pressure with carbonic acid, with care so as to make the union as intimate as possible. It should, therefore, always be done at a low temperature and allowed to lie in the warehouse some time before used. When well made the water should be quite clear with a slight yellowish-green colour.

Dose.—The above 600 grammes represent one bottle, and the patients consumed in general from half to one, or to two, bottles daily in divided doses, viz. in five doses, and it was ordered to be taken not on an empty stomach as then a quarter of a bottle may excite vomiting. The dose is thus about nine twentieths of a grain per day in five doses of about one eleventh of a grain each. Many persons can take thus one bottle daily for 100 to 150 days, but in some it has to be stopped owing to insurmountable disgust for the drug after taking one or two dozen bottles. Some persons have drunk sixty bottles in thirty days without any injurious effects to the health ultimately. Nevertheless the author reports some of the symptoms indicated in the foregoing proving in patients taking the above doses of chrome water, such as uneasiness in the stomach, nausea, vomiting; constipation or diarrhœa;

very rarely salivation and the non-affection of the gums and teeth in general form a very favorable contrast to the mercurial treatment; yellowish tinge of skin but not conjunctiva; pustular eruptions like acne, seldom painful boils; vertigo; palpitation; many varieties of gastro-intestinal catarrh. So that he considers that counter-indications to its use are given by: insurmountable disgust for the drug; diseases of the stomach and intestinal canal; hæmoptysis; palpitation from organic disease; apoplectic vertigo; Bright's disease and catarrh of the bladder and urethra.

It is obvious from what has been said in the previous part of this treatise that Güntz's counter-indications depend on the excessive dose in some cases and on the carbonic acid and possibly the other ingredients in the chrome water in others. We have seen that in proper dose and in simple solution in water the K. bich. has cured these very disorders, especially the stomach and intestinal catarrh, which are said here to counter-indicate its use; they do certainly counter-indicate his formula and dose of chrome water. It remains, however, to be determined by experience whether the comparatively large dose he gives is essential to the cure of syphilis, in which case these states must be held to counter-indicate the chrome till they are cured by suitable treatment. During the chrome-water cure Güntz enjoins a simple nutritious diet, avoiding beer, acids, and fatty things.

Results of Güntz's treatment of syphilis with chrome-water.—He first settles the period of incubation by his own observations and those of the best text-books, and concludes that the constitutional symptoms appear on the average seventy-two days after infection. By that time in the greater number of cases the disease has appeared or does not come at all. Still, exceptional cases may appear as early as twelve to fifteen days or as late as 159 days, and, in one reported case, as six months. Sigmund gives ninety days, after which practically the danger may be considered over.

As a preventive of constitutional syphilis he gives 100 cases treated during the primary sores with chrome-water alone, and of these sixty-four, or nearly two thirds, remained free from constitutional syphilis, a result which is not even approximately reached by any other method hitherto known. He reviews with great care and detail all the obvious and possible objections to the validity of this conclusion, such as error of diagnosis by excoriations, soft chancres, chancroid and the like, as well as a possible specific influence of the local treatment, and I think meets all these objections with success. With respect to the last it is well known that the mere healing of the chancre by local treatment, even if that comprises a true specific, like mercury, has no power of aborting and curing constitutional syphilis, but besides the author finds in the comparative progress of the chancre under the best local treatment, with and without chrome-water internally, furnishes a strong proof of the specific power of the latter as an abortant of the constitutional disease. The best local treatment the author holds to be strewing with finely powdered pure iodoform, and although this alone heals generally the primary sore, yet when the chrome-water is given internally at the same time he noticed that the induration was retarded and less pronounced; in some cases when the primary sore had lasted

sixty days or more it healed rapidly after a few doses of chrome-water, and the induration is absorbed more rapidly than with local treatment of any kind alone. The action of the chrome-water on the accessory phenomena of the primary sore before the outbreak of the general eruption stage is thus noted by Güntz. The swollen lymphatic plexuses and the indolent buboes, even of great size, visibly and rapidly subside without suppuration, although they may continue to grow slowly during the first and second weeks after beginning the chrome-water. Their progress to cure is much more favorable than under mercury, which either excites suppuration or a slow process of breaking down which takes months to run through its course, whereas here suppuration is mostly prevented and the swelling is removed in a few weeks. Finally, in those cases in which the chrome-water treatment of primary syphilis did not prevent the outbreak of the secondary symptoms, Güntz states that these latter were milder, and as it were modified. Güntz next gives a summary and often full report of his whole cases treated with chrome, amounting to 416, illustrating the various points of its action in fully-developed syphilis, besides its abortant power just noticed. In all these cases complete cure, or almost complete disappearance of the symptoms, was attained before the patients were lost sight of, but in 137 time was given (between about three months to two years) to see whether relapse occurred, and of these 120 had no relapse, while in seventeen relapse occurred. Even if we subtract the sixty-four cases in which no secondary symptoms appeared after treatment of the primary with chrome, still there remain fifty-six in which secondary and tertiary symptoms were cured without relapse against seventeen with relapse. If it be urged that in many of the cases long enough time under observation had not elapsed, the author gives fifteen cases under observation above two years, and fifteen between one and two years without relapse. These results are more favorable than those attained under mercury.

I may now notice some of the chief items of practical information contained in his detailed cases:

Case 1.—Primary indurated chancre which had lasted 120 days, in spite of constant treatment with carbolic acid at one time and dry charpie at others. Chrome-water for twenty days. The ulcer began immediately and palpably to amend, and healed quite with no constitutional symptoms afterwards. He discusses, and I think fully meets all the obvious objections to this case.

Case 2.—A bubo the size of a hen's egg went down to half the size in twelve days. Secondary symptoms mild on sixty-third day, and complete cure on seventy-eighth day from infection.

Case 3.—Treatment begun on twenty-first day. Secondaries early and mild, and total cure in forty-eight days.

Case 5.—Treatment begun on the thirty-fifth day after infection. Plaques on tonsils on forty-fourth, and roseola on the forty-eighth day. But the action of the chrome was distinctly seen in the fact that the plaques showed a peculiar appearance at the outset, and at once displayed an inclination to retrograde metamorphosis.

In Case 7 an indolent bubo had formed and continued to develop after the cicatrisation of the primary sore, and a proof of the action of the chrome was given by the fact that the bubo was completely absorbed by the forty-fourth day after infection.

Case 9 showed the action of the chrome in the fact that a primary sore, which had lasted sixty days unchanged, healed up in three days under large doses of chrome-

water, and the swelling of the inguinal glands subsided rapidly. Mild general syphilis appeared on the eighty-fourth day and was cured by the 100th day. No relapse.

CASE 17.—An old sore healed with soft cicatrix was accompanied with an indolent bubo. Later on inflammatory symptoms set in, but suppuration was prevented. "We have here again an example how by the prompt action of the chrome-water the swollen indolent glands were brought completely to resolution."

CASE 20.—Here was a large deep Hunterian chancre, followed by suppurating bubo. After the chancre had long been healed, the contact of the pus of the bubo with the overhanging skin of the belly produced auto-inoculation of the infectious ulcer. The remarkable point here is that the chancre had long since cicatrized, while the bubo still retained an infectious character, so we are justified in assuming that the blood was already affected, yet under the chrome treatment general syphilis did not break out. This cannot be explained on the soft chancre theory of the dualists, because then the auto-inoculability of the bubo should have been extinguished when the primary sore healed.

CASE 23 was a striking proof of the virtue of the chrome-water. Induration lasting till the 120th day after infection. Then after fourteen days and fourteen bottles of the chrome-water all the symptoms were removed, and no general syphilis followed.

In CASE 30, also an indurated primary sore, which had lasted 100 days, was healed in fourteen days, and no general syphilis followed.

In CASE 32, a primary ulcer and swollen inguinal glands of twelve weeks' standing were removed in fourteen days, without subsequent general syphilis.

In CASE 48, the primary sore, which had lasted seventy days, healed up under chrome-water in seven days without any local treatment, and no general syphilis followed.

In CASE 61, after hard chancre, under chrome-water treatment, general syphilis broke out on the seventy-first day, but the symptoms were mild, and showed from their outset the character of retrograde metamorphosis.

CASE 77.—Two large indurated chancres on corona glandis seen first on eighteenth day from infection. For eight days iodoform locally with no benefit, then chrome-water begun on twenty-sixth day, when also the inguinal glands had begun to swell. After twenty-four bottles in nine days ulcers nearly healed, but induration and general syphilis came on, and not completely removed till after the ninety-fourth day and 114 bottles.

CASE 87.—Hunterian chancre on the prepuce with hard infiltration of left inguinal glands, painful and reddened and threatening suppuration, on twenty-eighth day from infection. Chrome-water internally and iodoform locally, nevertheless during the next seven days the infiltration of the ulcer increased, but the redness and pain of the bubo were not worse. By the forty-fourth day, after sixteen bottles of chrome-water and the iodoform locally, the tendency of the ulcer to spread still continued, but the inflammation of the bubo had been resolved and the swelling nearly gone. On the forty-fifth day the ulcer began to improve, and by the sixty-third day, after thirty-one bottles, all symptoms were gone, and the treatment was stopped. But on the eighty-fifth day mild general syphilis broke out and was cured by twenty-four bottles more.

CASE 89.—Infection twelve weeks before. Cartilaginous chancre the size of a bean, secreting little. Slight inguinal swelling. After chrome treatment the ulcer was skinned over, and ultimately the induration entirely absorbed, and the skin, rash and other signs cured.

CASE 90.—Infection fifty-two days before, frænum destroyed, several chancres on corona glandis, and one indurated, elevated, and secreting copiously. Swelling in right groin; no general syphilis. After five bottles in five days the indurated sore skinned over and button-like, and the skin over it of the usual bluish livid colour. In three days more and three bottles, all the sores healing obviously, and glands in groin going down. On the sixty-eighth day, after sixteen bottles, copious macular eruption distinctly syphilitic, but as if already in the declining stage, evidently showing the specific action of the chrome.

CASE 91.—A man of 45, after alleged possible infection from a kiss, date not exactly given, had for three weeks had a syphilitic ulcer the size of a sixpence in the upper lip. The sore had the characteristic cartilaginous hardness of base, becoming

white on pressure, bnt otherwise grey and secreting moderately; the whole upper lip moderately infiltrated Cervical glands slightly swollen. No treatment hitherto did any good. Now no local treatment was used, but K. bich. given in pills, grammes 6·0 divided into 600 pills, of which six to eight were taken daily. After two weeks no change perceptible; but in another week signs of healing beginning, viz. the usual bluish livid colour at the border of the sore, while the ulcer became cleaner. After another week the sore skinned over pretty quickly, leaving a somewhat depressed indurated cicatrix still desquamating. Ultimately complete cure and no general syphilis.

Case 95 had been treated till the sixty-third day after infection by iodoform ointment alone, and no internal medicine. There was an infiltrated elevated ulcer on the body of the penis, hard and fissured, and with swollen excavated edges; a similar sore at the orifice of the urethra. In fourteen days with chrome-water inwardly, and pure iodoform strewed on the sores they were all healed, leaving a button-like induration at the seat of the elevated ulcer on penis. After thirty bottles all induration absorbed, and no general syphilis, nor up to the 137th day.

In Case 100 Güntz notices that the specific influence of the chrome was seen in the rapid and complete subsidence of the inguinal swelling, and in the early and copious desquamation of the roseola eruption.

These 100 cases form a list in which general syphilis had not made its appearance before the chrome treatment was begun, and from which the statistics of the preventive influence of the drug were taken. The cases omitted by me in the above analysis gave no additional information on the nature of the action of the medicine. They are given in full by the author as evidence of the truly syphilitic nature of the primary symptoms, which were not followed by general syphilis, presumably owing to the preventive action of the chrome, and need not be repeated here.

Here follow now short notices of fifty-three cases, which were under chrome treatment for only a short time. Most of these show a marked improvement of the symptoms, but we may pass over them, and give our chief attention to the next chapter, consisting of 110 cases, in which general syphilis had already appeared, and was treated with chrome-water alone for a considerable time.

Case 155.—A healthy young man had a chancre cauterized and healed on the fourteenth day. On the thirtieth day from the infection began the chrome-water, and took a bottle daily. On the seventieth day syphilitic exanthem came on and continued to increase till the eightieth day; then mucous patches in the mouth for four weeks, when all signs disappeared, and there had been no relapse two years after.

Case 157.—Indurated præputial chancre of six months' standing, indolent glandular swellings in groin, throat-ulcers, and copious papular rash all over. After forty bottles in forty days, nothing left but slight swelling in groin and traces of eruption. After one bottle daily for twenty days more all symptoms gone.

Case 160.—Nine months after infection, and without any treatment; plaques on tonsils and spreading ulceration, tubercular ulceration at angles of mouth; inguinal glands swollen in a cluster on right ride. Seven bottles in seven days, then surprising improvement, plaques and inguinal swellings quite gone, and angles of mouth nearly healed.

Case 161.—Girl, aged 22, infected three or four months before; ulcer on labium, plaques on tonsils coppery spots of psoriasis guttata all over. Eighteen bottles in twenty-one days. Then the psoriasis spots almost all gone, and the traces brownish, not coppery, ulcer and plaques gone. Patient not seen again. Here as in many other cases is shown very rapid amendment, if no previous treatment had been used.

Case 163.—A woman of 23, syphilitic for four months; ulcers in vagina, mucous patches; psoriasis on skin; ulcerated throat; emaciation. She took three bottles in three days, and improved visibly. Then ozœna and desquamative patches on tongue appeared. In the next thirteen days took five bottles. All symptoms were then so much better that she could resume her occupation, and took ten bottles in the next ten weeks. All symptoms gone except swelling of the bones and periostitis in wrist, which also disappeared in four weeks. The author thinks here the doses were too few and too much interrupted, although rapid improvement was shown on each return to the medicine.

Case 164.—The infant of the above had plaques, tubercles, and condylomata, and

episcleritis scrofulosa. Fifteen bottles in fifty days; then an attack of feverish diarrhœa, and treatment stopped although the syphilitic symptoms not quite gone, but they were quite gone in six weeks more. No relapse, and a year after the child was seen in perfect health.

Case 165.—Syphilitic ulcer of six weeks' standing. No local treatment was used at any time, on purpose to see the effect of the internal chrome treatment alone. One bottle daily for forty days. On the second day of the treatment copious papular rash, which began to pale on the eighth day, and was gone, with all traces of syphilis, on the fortieth day; the ulcer healed rapidly, and was gone by the sixteenth day.

Case 167.—A girl of 22. Infection about ten months before. Face disfigured in a disgusting way with impetigo, dry and moist yellow crusts on cheeks and nose; corona syphilitica on forehead, swelling of cervical glands, all which had lasted nine weeks, always getting worse. No other sign of syphilis. After four bottles in four days all the crusts had dropped off, leaving smooth pink spots. After eight more bottles in eight days, the corona scarcely perceptible, and the pink spots almost indistinguishable, The cure was complete and permanent, as was ascertained two years afterwards. Güntz thinks this a brilliant success.

Case 172.—Tertiary syphilitic, impetiginous fœtid ulcers extending into nostrils and destroying the septum partially, but nose not fallen in. All kinds of treatment except mercury and iodine had been tried in vain. Also she had nocturnal pains in the bones all over, but especially of the head, which confined her to bed. After fourteen bottles in ten days, the healing process had begun and the crusts drying off leaving a healthy surface. The treatment was continued for six weeks more, making in all seventy bottles taken. The cure was then complete, and the shape of the nose preserved. There had been no relapse two years after.

Case 243.—Ozœna and destruction of septum and some bones of nose and disfigurement. After seven bottles in seven days, smell and other symptoms strikingly improved.

In Case 176, under twenty-four bottles in twenty-four days, a chancre of three weeks' standing and soft, became indurated and then healed, but no swelling of inguinal glands took place.

Case 179.—Period of infection unknown. A woman of 35 had ulcers and condylomatous growths in the throat, with swelling of the velum in which there was a clean-cut hole, and the appearance as if farther perforation would take place. After six bottles in six days, distinct signs of healing. After six more bottles in six days, the hole in the velum was quite healed up. After another seven days, and in all nineteen bottles, another deep depression in the posterior arch of the soft palate began to fill up and skin over. After sixty-one days, and in all forty-one bottles, the cure was complete and permanent. In this exquisite case, the author notices that no local treatment or surgical interference was used.

Case 181.—Syphilis of brain or membranes. About nine months after infection, a man of 36 had paresis of tongue with indistinct, stammering speech and difficulty of swallowing food and drink; impetiginous crusts in nose; aphonia; nothing in throat to cause the dysphagia. After twenty bottles the crusts began to heal, and an astonishing improvement in the speech and swallowing took place. After in all forty bottles the crusts were healed and the improvement of speech continued, but the voice was no better.

Case 185.—Infection about four months before. Ulcus larvatum, great swelling of groin; dark syphilides and infiltration of scrotum; a large hard knot is felt on the inner fold of the phymosed prepuce. On right temple a brownish-red infiltration of the skin the size of a two-shilling piece. Moist crusts on hairy scalp. After twenty-one bottles in twenty-one days, remarkable improvement of all symptoms; the prepuce could be partially drawn back, and the discharge from below it stopped, because the hard chancre and plaque-like places were healed. After forty-one bottles in forty-eight days, prepuce could be quite drawn back; skin eruptions mostly gone, but some remaining had changed into the lichen and psoriasis form. With various pauses the total treatment lasted 220 days, during which eighty-five bottles were consumed. The cure was complete and permanent.

Case 191 was a case of brain and general syphilis cured by one bottle a day for fifty-six days. Slight hemiplegia not preceded by unconsciousness, followed by

dragging of one leg, and weakness of the hand; impetiginous and tubercular eruptions, &c. After eighteen days the paralytic symptoms were entirely gone, and the skin and other symptoms rapidly improving.

In CASE 239, spinal paralysis was remarkably relieved by twenty-five days' treatment. Then six weeks after relapse, and patient was lost sight of.

CASE 200.—Infection four months before; induration on prepuce and swollen lymphatic cords on penis; plaques on tongue and hoarseness. After only two bottles in three days the plaques on tongue had become bluish livid, and had begun to heal, the voice stronger, and other symptoms improved. Complete cure in four weeks and fifteen bottles.

CASE 203.—Indurated chancre-cicatrix, papular rash, condylomata, and plaques. In fifty-one days all symptoms gone, although only fifteen bottles had been given up to the thirty-seventh day, and none after that. [It is quite probable that smaller doses than those generally given by Güntz may be sufficient. In this case the total quantity of the bichromate used was 6·7 grains.]

CASE 204.—*Iritis, &c.*—Infection six months before; for four weeks extensive papular rash and condylomata on scrotum, and for five days exquisite iritis syphilitica, with great photophobia and contracted pupil; no synechiæ; at the ciliary border considerable injection of the vessels and redness of the sclera. Intense pain in the forehead, no sleep, no fever, vision very indistinct, owing to the lachrymation and photophobia. Three bottles in three days. Iritis perceptibly better. Eight bottles in the next eight days. Iritis strikingly better, though still some redness, but no tenderness to light, no pain, only slight tenderness of globe to touch. Three bottles in the next seven days; thus fourteen bottles in eighteen days entirely removed all eye symptoms, and the condylomata and rash almost gone also. Two bottles in the next seven days removed all signs of syphilis. After no medicine for three weeks relapse of skin symptoms, but the eye remained well. The other symptoms were permanently cured by continuance of the chrome-water without so many interruptions.

CASE 210.—Indurated chancre of three months' standing; plaques; macular eruption. The rash was aggravated and then better before the sore healed, and new symptoms came on. Doses large. Sixty bottles in forty-three days. The new symptoms were drawing pains in leg, vertigo, loss of sleep, chills and fever, and headache. Güntz remarks, "In spite of the larger doses and subsidence of the symptoms under them, new symptoms made their appearance." No doubt it was from the excessive dose.

CASE 216.—*Periostitis cranii.*—Chancre and bubo eight years before, and four dead fœtuses; no other signs of syphilis. For six weeks, a swollen, not reddened, place on one side of hairy scalp, and from it radiated nocturnal tearing bone pains with frequent slight vertigo; the part very painful to touch. To palpation the place, about the size of a five-shilling piece, gave the signs of a *periostitis cranii circumscripta*, and on tapping on it with the finger the patient cried out loudly, and said the pain was seated not in the scalp, but in the bones. Circumscribed red scaly spots on face and neck. After two bottles in two days notable improvement, and after seven bottles more no traces of tenderness or pain. Eruption gone fourteen days after. [Compare this with symptom 13*a* of the proving.]

CASE 224.—Infection three and a half years ago. Besides hard infiltration of skin of penis and plaques, an indurated bubo, with a fistulous opening discharging at times a serous fluid; falling off of hair. After ten bottles in ten days the fistula in the groin healed up in a surprising manner completely without any local treatment! After forty bottles, the whole symptoms were cured.

CASE 225.—A muscle-gumma on thigh and exostosis on ulna, cured with fifteen bottles in twenty-nine days.

CASE 242.—Hereditary syphilis in a girl from 10th to 14th year; crusts on skin of body and face, sternum inflamed and carious with fistulous openings. Dactylitis syphilitica on two fingers of right hand, and same on toes of left foot. Remarkable improvement after twenty bottles in twenty days.

CASE 251.—Along the crista tibiæ, and on the flat surface of the bone, a periostitis 5 centimètres long, which had lasted six weeks, getting more intense daily; with horrible pains, especially at night; febrile paroxysms on several days; no swelling or redness; on the slightest touch such pain that he cried out. On deep pressure an elastic non-fluctuating feel was given, as if the bone gave way. Pain in the above part on knocking the heel or rising to his feet, and could not stand for any length

of time. After four bottles in four days no improvement, but after four more complete subsidence of the pain; after sixteen bottles cure.

Case 252.—A girl of 24, infected some months, primary chancre not present. Complete aphonia for four weeks and plaques on tonsils; no pain. Also masses of broad moist fœtid condylomata on genitals, and papulous syphilide on body. After eight bottles in eight days, voice beginning to return, and genitals much improved, though no local means had been used. After twenty-five days and twenty-five bottles voice completely restored and health good, except some plaques on tongue. Patient then stopped treatment, though not cured.

Case 264.—Obstinate primary sores finally cured without constitutional syphilis. A powerful man of 26, showed, on the ninth day after infection, two soft sores on one side of frænum and one lentil-sized hard sore on the other side. By the twelfth day four bottles were consumed, and the sores powdered with iodoform. The soft sores then healed, the hard one unchanged. On eighteenth day, after fifteen bottles, the hard sore skinned over, but leaving a hard lentil-sized basis, the skin over it whitening on pressure, and the inguinal glands swollen on both sides. After the thirtieth day and thirty bottles the patient looked pale, and the hard place and cicatrix again excoriated with overhanging edges, forming an indurated ulcer, but the swelling of glands had gone down. After thirty-eight days and forty-five bottles, the ulcer elevated, and its hard base more marked, and the sore funnel-shaped. After forty-eight days and sixty bottles, the sore breaking up, and showing three granulations and copious suppuration, but no sign of healing. After fifty-two days and seventy-two bottles, the sore, which had been latterly dressed only with wet lint, showed signs of healing and became bluish. After seventy-eight days and 100 bottles, the three prominences were absorbed, and the hard ulcer healed with a normal skin, and very little induration to be felt under it. After eighty-nine days, induration gone and healing complete. No constitutional syphilis appeared, nor did any appear during 180 days, during which the patient was kept under observation.

Besides these cases in which K. bich alone was given, sixteen cases are detailed in which k. hydriod. was used as part of the treatment either at the same time—not mixed in the same prescription, but at different times in the same day—or by itself after stopping the chrome. These cases were for the most part successful, but no general principle is laid down on which to decide when the k. hydriod. is to be added to or substituted for the chrome.

In Cases 265, 266, and 267 the cure was proceeding very well when the k. hyd. was added or substituted.

In Case 269 the plaque and eruption were improving when, after seven days, the chrome was apparently not well borne, exciting, it is said, vomiting and fever; so it was left off and twenty-four grammes of k. hyd. given in thirteen days, with some benefit. Then again six bottles of chrome-water in seven days with much greater improvement, and so on, one or other medicine till cure.

Case 270.—A girl of 22 with plaques on vulva and tonsils, fluor albus, swollen inguinal and cervical glands, psoriasis over whole trunk, corona on forehead. After eighty-five bottles in eighty-five days all symptoms gone, except some slight patches of psoriasis on neck. She remained six weeks without medicine, and then slight return of infiltration on neck and elbow, and some falling off of hair. She got now fifteen grammes of kali hydriod. in two months, and was then well.

Case 271 was one of tertiary ulcers on legs and muscle-gummata nearly cured, but on account of headache k. hyd. was substituted and completed the cure.

Case 272.—Symptoms all removed after thirty-nine bottles in thirty-nine days. Four months afterwards relapse of throat and nose symptoms, and rapid and permanent cure with kali hyd. Güntz thinks that k. hydriod. acts better after a previous course of chrome.

Case 273.—Relapse of syphilis after six years' apparent cure. The chief phenomena were gummata of the skin, which showed under chrome, reaction in all stages. "While one gumma was being absorbed comparatively quickly, another softened and then became indolent, another mildly inflamed and then the inflammation subsided, another again became furunculous and suppurated." They were mostly absorbed under chrome, and then the amendment stood still, but went on again rapidly after an interval of k. hydriod. treatment, although that did not seem to have much direct effect. Güntz thinks that these two medicines mutually pave the way for the curative action of each

other, as it was shown also in several others we need not enumerate, except that two were affections of the bones.

Case 277 was one of plaques on tonsils and lips, prostration of strength and almost continued bone pains, and pains in the head, which confined her to bed for eight months. After nine bottles in twelve days remarkable improvement of the pains and all symptoms, and after three bottles more, and six days, the pains were gone. After in all twenty-one bottles all syphilitic symptoms gone, but for some return of frontal headache k. hydriod. was given with effect.

In Case 279 the nocturnal pains in the head were much improved after chrome, but were completely cured by k. hyd.

Here follow seventy-seven cases treated with chrome after mercurial treatment. In these there were relapses or uncured remains of syphilis in various forms, especially exostosis and periostitis, tubercular and impetiginous skin eruptions, indolent ulcers and glandular swellings, &c., after one or more courses of mercury, mostly removed permanently by chrome.

Among them we may note Case 285, in which there were excruciating nocturnal pains in the head, and during the day vertigo and vomiting with clean tongue. Speedy benefit on beginning the chrome-water, and cure in twenty-four days.

In Case 317, a six months' energetic quicksilver cure had no effect on the disease, while after eight days of chrome the condylomata healed rapidly.

In Case 321, after frequent courses of mercurial inunction, the patient had the septum gone and the nose fallen in, with perforating ulcer in the roof of the mouth, and intense ozœna so that the air of the room was poisoned, and the smell was perceived a long way off. After only six bottles in six days, without any local application, the ozœna was completely cured, and remained so permanently. The other symptoms were ultimately all removed by continuing the chrome.

In Case 322 the yellow iodide of mercury had been given for the four months succeeding the infection, but there remained cartilaginous hardness of the primary sore, and infiltration of the prepuce and phimosis, while copious maculæ broke out all over, with sorethroat, pains in limbs, and falling off of hair. After eighteen days of chrome-water universal improvement, and phymosis gone. Cure in fifty days.

In Case 325 the patient had had several inunction cures, and was apparently quite cured, and had begotten two healthy children, when, nine years after the original infection, he still had a dread of possible disease, and was put under a course of chrome-water. During this the mucous membrane at the seat of the former plaques, and which had shown no signs of the least abnormality for years, displayed epithelial desquamation and milky patches, where exfoliation of large patches of the mucous membrane took place.

In Case 326 there was hereditary syphilis in a child 4 years old; nails split and deformed; teeth ill developed; crusts in nose and ozœna; rupia crusts over the body. Mercurial inunctions did no good in four weeks, then after six bottles of chrome-water in ten days, all symptoms gone or materially improved, when the cure was interrupted by measles, but continued afterwards to complete success. Güntz remarks that this confirms the opinion that mercury acts ill in the rupia form of syphilis, while this case shows the power of chrome in such.

Case 328.—Hard swelling of the cervical glands remaining after an inunction cure of syphilis yielded to twenty-five bottles of chrome-water.

Case 332.—Ulcus induratum, of eight weeks' standing, roseola, and angina. Had been treated with sublimate internally without improvement. After forty bottles in forty days, all symptoms gone.

Case 335.—Brain tumours, with dilated pupil and violent nocturnal semi-lateral headache remaining after inunction cure of syphilis. The headache and dilated pupil removed after fifteen bottles in fifteen days.

Case 337.—Syphilis six years before. Cured by inunction of mercury. Nose swollen and painful, and the bones inflamed; horrible ozœna; perforating ulcer on hard palate into the floor of the nose, discharging fœtid bloody mucus and pus into the mouth and hindered eating; day and night tormenting pains in the nose, ears, and whole head; deafness. After only three bottles of chrome-water in six days, the astonishing result was attained that the smell was gone and hardly any discharge remained, headache slight, and tenderness of nasal parts gone. After forty-six days

and thirty-one bottles, complete cure. The perforation was of course not filled up, but the progress of the ulceration was stopped at once, and at last a false palate was borne comfortably. Güntz considers this to be a brilliant example of the power of the chrome.

Case 346 was a similar one, though not so brilliant, and the palate required a surgical operation, and was permanently relieved by it and the plate. Güntz here cautions against premature surgical interference before the specific disease is extinguished, as it was here, by the chrome treatment.

Case 350 was one of infiltrations and tubercular proliferation of the soles of the feet and excoriation on the toes after syphilis, treated with mercury ten years before. Cured with thirty-two bottles.

Case 351.—Syphilis treated with inunction cure eight years before. For the last six months loss of voice, plaques on lips and tonsils. The vocal cords were swollen and streaked red. Complete cure after fifteen bottles and thirty days without any local treatment.

Case 352.—Painful plaques on tongue, after syphilis treated with subcutaneous injections of mercury. Cured after ten bottles in ten days without local treatment.

This last, however, was necessary in Case 353, of condylomatous growths on soft palate and tonsils after syphilis treated by inunction five months before. Great improvement after chrome-water, but not cured till they were pencilled daily with a solution of bichromate 0·1 to 50·0 of water.

Case 356.—Lung-syphilis. A midwife got hard chancre in the finger and was cured with twenty inunctions of mercurial ointment. Ten years after moderate hæmoptysis for six weeks, then a more copious attack. No tubercular signs, but infarction in the lung, which was deemed syphilitic. After four weeks' treatment with chrome-water, she was cured and remained well.

Here follow sixteen cases treated with chrome and kali hydriod., after mercury. In these the chrome bore a chief part in the cure, but they do not add much to our knowledge of its action. Then follow fourteen cases treated with chrome, after mercury and kal. hydriod. had been used. They are also mostly successful, and show the power of the chrome, but it is difficult to determine how much of the result belongs to the other previously used specifics. Among this list is Case 384.—Lung-syphilis and hæmoptysis, the diagnosis of which was confirmed by Lancereaux, cured permanently under chrome. In Case 388, after much misery, the patient had, in addition to syphilides, signs of mercurialism. After sixty-two bottles, both syphilis and mercurialism vanished. Then follow six cases of chrome-water alone after mixed treatment, *i.e.* other medicines after mercury and iodine. Here we may notice 393, which was infected three years before; plaque and tubercles at the angles of the mouth and lips very painful. Sublimate, sulphur and saline baths, iodid. pot. and iron, and locally nitr. argent. Then thirty bottles of chrome-water did no good at all. This is unusual, but Güntz remarks that such erosions after severe mercurial medication are most refractory to all treatment. The remaining cases are all of various mixed treatments, and afford us little definite information.

Systematic Arrangement of Güntz's Cases of Syphilis Cured by Chrome.

Although Güntz himself has declined to arrange his cases in the order of the anatomical seat of the disease, or the stage of the disease as primary, secondary, and tertiary, on the ground that nearly all cases are complicated, yet for convenience of reference, I think it well to give an analysis of the cases in a systematic form.

As regards the primary sore, it was observed that under chrome the development of the induration was slow and less pronounced, but complete healing was attained without leaving any indication of disease. This is illustrated among others by Cases 89, 90, 91, 165, 176, 198, 210, 254, &c. In cases of long-standing indurated sores, which had resisted many other modes of treatment, healing and absorption took place rapidly, see Cases 1, 9, 23, 30, 32, 48, 77, 203, 224, 264, 322, &c. Even cases of cartilaginous hardness softened and were absorbed; see 89, 91, 185, 322. It was especially noted that in many of all the above cases no local treatment was used, as is stated in 165. The formation of the cicatrix was attended with the appearance of a

characteristic bluish-white livid colour. This remained for some time at the spot where the primary sore had been healed under the action of the chrome. Güntz considered the appearance of this colouration to betoken the approaching healing of the sore, although no other signs of amendment might have as yet shown itself. He is also inclined to consider the appearance of it as a diagnostic mark of the syphilitic nature of a sore healing under chrome; see 91, 264. The local inflammatory symptoms accompanying chancre, such as phimosis, balanitis, &c., yield under the chrome treatment without local medication; see, *e.g.* 185, 322. The swelling of the inguinal glands softens and is absorbed often rapidly, and threatening suppuration is averted; see 2, 7, 17, 87, 160, 224, 264, 326. Affections of the cervical glands also give way, *e.g.* Case 241. There remained, after syphilis five months before, only condylomata and swelling of the cervical glands. After twenty-one days and twenty-one bottles, condylomata small and shrivelled, and with the characteristic bluish lividity of the chrome treatment, but the glands apparently unchanged. Then on continuing the treatment one gland below ear the size of a walnut became red and tender, but after seven days more became smaller than before, and painless. After in all fifty-two days glands natural. See also 328.

Plaques or mucous patches, see 5, 155, 157, 160, 161, 163, 164, 203, 210, &c. Condylomata, 164, 179, 203, 252, 317, &c. Besides these are some cases in which these were almost the only symptoms, *e.g.* Case 166. Elevated broad condylomata at anus after syphilis one year before. After seven bottles in seven days great improvement, and condylomata smaller and drier; then in addition, local application for five to ten minutes daily of a solution of K. bich. 0·5 to 140 water, while the chrome-water was continued internally. Complete cure after twenty bottles in twenty days. In Case 177 plaques on the lips, which were the only symptoms, were cured after four bottles in four days. In Case 234 similar plaques inside the cheeks and at angles of the mouth were cured after ten bottles in ten days. Many similar cases are given, but in Case 393, which see, no benefit followed. In Case 325 old, apparently long healed, plaques desquamated under a course of chrome.

Condylomata and plaques.—Case 178.—Large plaques on tonsils, and large nfiltration and very moist condylomata on the labia. After six bottles in six days emarkable diminution of all the morbid growths without any local applications. After in all eighteen bottles in eighteen days, improvement, which had further advanced, now stood still, and a solution of K. bich. 1 to 150 of water was applied, and four bottles taken inwardly in eight days. Then the throat was cured and almost all the condylomata of vulva gone. After in all twenty-seven bottles in thirty-three days, medicine was stopped, and the cure was found complete in twenty-seven days more—seventy days in all.

Case 237.—After thirty-five days' chrome treatment with good effect for plaques and maculæ, the patient got iritis, and was treated by an oculist with mercurial frictions, followed by k. hyd. The iritis was cured, but plaques and maculæ returned, and were finally removed by chrome.

Case 238.—Infection four months before. Maculæ, impetiginous crusts on chin, angina, deafness, violent headache, swollen inguinal glands. After sixty bottles in sixty days, all healed except some condylomatous patches at anus, when the patient refused to take any more, owing to insurmountable disgust for the medicine.

Among the cases in which the skin was particularly affected we may notice the following:

Case 218.—Chancre six months before: now plaques on amygdalæ, and crusts on hairy scalp, with falling out of the hair. After twenty-two bottles in twenty-two days, plaques healed, no more crusts or desquamation, and hair no longer falls out as before.

Case 231.—Rhagades on scrotum and anus, plaques in throat, indolent bubo and deafness. After five bottles in six days, and no local treatment, the rhagades of scrotum and condylomata of anus much improved, and the hearing distinct. After five more bottles and ten days, all healed. Many similar cases.

Case 233.—Serpentine ulcers and crusts on face, forehead, and nape; fever and gastric catarrh. After six bottles, remarkable change and subsequent cure.

Case 358 is a similar case of ulcers, but on the leg. See also 165.

Case 240.—Corona syphilitica, crusts on scalp and scrotum, indolent bubo, cured.

Case 254.—Large patches of impetiginous crusts over the body, and tuberculous

knots on the face. White radiating syphilitic cicatrices left here and there. Much improved, and then left off treatment. See also 167.

CASE 255.—Impetiginous crusts showing, when removed, dry desquamating, excoriated infiltration; also skin-gummata; numerous cicatrices like smallpox cicatrices, some white and others dark coloured. After fifty bottles in fifty days eruption cured, and also the gummata, most of which shrivelled away, and one suppurated.

CASE 256 was also one of tuberculous crusts and skin-gummata rapidly improved under chrome.

These cases may be instructively compared with the pathogenic symptoms or the skin, and the mode of healing of the chrome eruptions.

CASE 180.—Tertiary eruption, which had baffled all other treatment for twelve months. Impetiginous crusts on hairy scalp and temples, with old characteristic cicatrices on forehead. After six bottles, striking improvement; the crusts coming off and leaving a conical hole full of matter, and healing in another six days. In one month, after twenty-four bottles in all, this torpid severe syphilitic skin disease was rapidly and permanently cured.

CASE 202.—Infection twelve months before. On knee and both shins, large suppurating places, the size of the palm of the hand, covered with crusts, and undermined with fistulous passages. After fourteen bottles in fourteen days all the places healed, leaving a livid mark. Three months after, slight return of the dry crusts, which Güntz attributed to insufficient continuance of the drug.

CASE 205.—A man of 54 had had syphilis fifteen years before, treated only locally. For two years had obstinate syphilitic psoriasis palmaris, with horny masses in the palms, and perpetual desquamation of the skin of fingers, with tenderness and cracking. After six bottles in six days rapid amendment. After twenty-five bottles in twenty-five days complete cure, although for a slight redness returning in four weeks another twelve bottles were taken with permanent effect. Several similar cases are given.

CASE 154.—Rupia and tubercles and numerous ulcers covered with brown crusts, with fever and prostration five months after infection, cured in twenty-four days with one bottle daily. Several cases of inveterate tubercular infiltration and induration on the skin in various places were completely cured. Rupia: see also 326.

CASE 173.—Varicella-form of eruption after syphilis of unknown duration. A girl of 22 had on the neck and breast groups of circumscribed, longish infiltrations, feeling like parchment, and looking scaly, red and tubercular; more closely considered, they appeared like the first stage of varicella pocks. After twelve bottles in twelve days, they took on the form of varicella and varioloid and filled with pus. After twelve more bottles in twelve days they began to dry up and form crusts. Within the next four weeks all was healed, and no relapse in four months. The author thinks this a striking example of the benefit of the chrome, as this form is usually obstinate and is refractory to mercury, which is even dangerous. No. 348 is a similar case, after inunction cure of the primary syphilis.

For papular and macular rash, see 165, 203, 210, 252, 322, &c. General psoriasis 161, 163, 185, 270. Impetigo with thick crusts, 167. Corona veneris, 167. Falling off of hair, 218, 322. Skin affection of feet and toes, 350. Skin-gummata, 273. Muscle-gummata, 225, 271. Bone diseases, 216, 242, 251, 277. Periostitis cranii, 216, 285. Brain and spinal marrow, 181, 239, 191, 335. Iritis, 204. Nose: ozœna and ulceration, 172, 243, 337, 321, 346. Tongue, 163, 200, 252, 352. Palate, perforation of, 179, 337, 346. Throat, 179, 353, &c. Aphonia and hoarseness, 200, 252, 351. Lung-syphilis, 356, 384. Hereditary syphilis, 242, 326. Mercurialism, 388.

GENERAL THERAPEUTIC REMARKS ON THE CHROME TREATMENT OF SYPHILIS.

Güntz notices that when a person of good constitution reached a pretty advanced stage without other treatment, smaller doses are required, and the healing is rapid.

During the favourable progress of the chrome treatment, it may happen that

while some syphilitic symptoms are cured others may make their appearance, and ultimately disappear on continuing the medicine.

During the cure, the patient first loses the miserable feelings of languor and depression, and then a notable change in his appearance takes place, and the skin loses its pale unhealthy look, and the complexion becomes often blooming, and the patient gains weight and strength. Sometimes—in 5 or 6 per cent.—a characteristic eruption like acne comes out on the face and body,—the acne chromica. This is not a sign that the medicine disagrees, but merely that it should be laid aside for a time.

During the chrome cure the patient can generally go out and continue his business, unless he has an amount of disease of any organ or part which would have kept him in the house or in bed, independent of the syphilitic taint.

When, after sufficient chrome treatment, the secondary symptoms do break out they are often mild, and show from the outset the character of retrograde metamorphosis. See Cases 61, 90.

In the rupia forms, Güntz remarks that the edges of the ulcers do not become flabby and melt away with increase of size of the sores, as is the case mostly with mercury, which is seldom curative, but under chrome the gummatous masses are simply absorbed and the sores healed, or the environs become red and inflamed, and new pustules form, and the gummy infiltration suppurates out, and then healing follows. So the apparent aggravation of the disorder is to be regarded as the preliminary stage of the cure.

In cases where local application of the drug is necessary, viz. in languid circulation, venous obstruction, or a general low constitutional state, Güntz recommends a solution of K. bich. in the strength of 0·2 to 0·6 in 60· of water applied frequently for some minutes, or a weaker solution longer by means of lint or bibulous paper dipped in it.

Dose and preparations of the chrome for syphilis.—The dose of a specific medicine, even if homœopathic, cannot be determined *a priori*, but only by experiment on the patient. Hence the evidence of Güntz on the dose of this medicine required to cure syphilis, although he used it only empirically, must be accepted with the respect due to his large experience. In my opinion, nothing has retarded the acceptance of the homœopathic theory of specifics into general medicine more powerfully than the mistaken application of Hahnemann's dictum that when a medicine is truly homœopathic it cannot be given in too small doses to act curatively. The true meaning of this is simply that the limit of the dose by which cure is possible is as yet indefinable, for cases of exceptional susceptibility, which may be cured by a smaller dose than hitherto known, are always to be allowed for. Practically, however, I believe the limit is reached in the majority of cases at the lower dilutions, and that it may very readily happen, and as a matter of fact does happen, that many homœopathic cures are missed, owing to the excessive minuteness of the doses. This is particularly the case in diseases like syphilis in which there is a specific exciting cause still acting, and even growing and multiplying in its very action: here therefore a sufficient dose in amount and in frequency of repetition and length of continuance is essential to cure. According to the evidence of Güntz, about half a grain of the bichromate in divided doses daily for many weeks, or even 100 to 150 days, and in some cases one grain per day for some weeks, are necessary for complete cure of the disease. This evidence may be taken to show that these doses represent a maximum, which may be necessary in some cases. At any rate it shows that we cannot say that the chrome has failed to cure any case unless it has been given up to these doses. Nevertheless, it by no means follows that Güntz's doses are necessary or the best in many, or perhaps even in any cases. He seems to follow the usual principle in the empirical use of specifics, viz. to give as much as can be got into the system without provoking toxic or very disagreeable collateral symptoms. He has to resort to expedients to avoid those which disturb the purity of the experience, viz. combining the K-bi. with three times the quantity of nitrate of potash and nitrate of soda, and six times that of chloride of sodium, and the whole made into an effervescent mixture. Besides that, the doses are not to be given on quite an empty stomach. Notwithstanding all these precautions, there are still a considerable number of counter-indications. We observe also that in the partially successful or unsuccessful use of it by Heyfelder, Boeck, Dolbeau, and Jaillard, the doses were too large, and could not be sufficiently long continued. We see also in the successful cases of Gossman $\frac{1}{10}$th grain was used twice a day only.

In some of Güntz's cases also a considerably smaller quantity in all than the above maximum was quite successful, although he attributes the partial success of others to insufficiency of the doses. On looking into these latter, I notice that the treatment was frequently interrupted, and therefore it may have been the want of continuance of the specific influence of the drug, and not the amount of the total quantity that was wrong. If to these considerations we add the experience of the homœopathic school in which the lower centesimal dilutions were successful, I think we ought to begin at least with doses which require no expedients to prevent them from exciting disagreeable and toxic effects. These expedients are also often futile, as they are irrational compared with the simple plan of reducing the dose. The aeration of the chrome-water also adds to the expense, and thus hinders complete cure. I therefore recommend a simple solution of the bichromate in distilled water, one grain to the ounce. Of this five drops (= about $\frac{1}{100}$th grain) may be given three or four times a day, and the dose increased when necessary till it amounts to twenty-five (= about $\frac{1}{20}$th grain). I use also compressed sugar tablets containing $\frac{1}{100}$th grain. I have seen elevated indurated chancre heal rapidly, and the induration absorbed under these $\frac{1}{100}$ grain doses without any collateral stomach disturbance, but I have not had sufficient experience to say if that dose will fulfill all the abortant and curative functions described by Güntz. It is easy, however, to increase it. In the vast variety of secondary and tertiary syphilitic symptoms advantage may be got by using different preparations of chrome, and for this reason I have given the chemical data fully at the beginning of this treatise. I have used with advantage the neutral chromate in $\frac{1}{10}$th grain doses, the chromate of chromium and the green oxyde, in the 1st centesimal trituration.

Remarks on Güntz's use of chrome in syphilis.—This is the most important contribution to our knowledge of the therapeutic action of chrome since the provings of that drug by myself in 1843 and 1852, and by the Austrian provers in 1847. It establishes, by a long series of cures extending over fifteen years, the specific curative power of chrome in syphilis, and thereby confirms the predictions of the provings in a more complete degree than already done by the experience of the homœopathic school. Such confirmation was essential *ex usu in morbo*, before we could decide that the chrome action was the pathological simile of a specific contagious disease like syphilis in the sense that the resemblance was sufficiently close to enable this medicine to cure the disease specifically. For of course no chemical substance could reproduce the actual disease in its essential feature, viz. contagiousness. In ordinary non-infective diseases we require no confirmation *ex usu in morbis*, in order to justify us in prescribing with confidence drugs which produce on the healthy body the pathological simile of the morbid state before us. So Dr. Güntz must share the credit with the homœopathic school of the discovery that chrome must be admitted into and probably take the first rank among that small circle of medicines which have the power of specifically counteracting and curing the effects of the syphilitic morbid poison, independently of mere elective affinity to the seat of its action. This is already a very important discovery, although our knowledge of the differential diagnosis of the different forms which suit each specific is still incomplete. For, as we know, there is syphilis and syphilis; in some cases variations in the nature of the morbid poison, and in others in the constitution of the patient, produce varieties of the disease so great that in one mercury will fail and chrome succeed, or *vice versâ*, or both fail and the iodides succeed. There exists in individual cases a qualitative something in the nature of the disease which eludes the power of empirical knowledge to determine *a priori*. Güntz, whose knowledge on this point is entirely empirical, helps us little, although he professes to have some theoretical grounds for preferring one medicine to another. Practically, however, his advice amounts to that of all empirics, viz. chrome is the most effectual as an abortant and as a curative specific, and it is besides the safest; so give it first in all cases; if it fails try mercury, and if both fail give the iodides. This is too like the advice of the generality of text books to excite any surprise, but it may be useful and important as far as the first clause goes. The foregoing cases show that as an abortant it is more powerful than mercury, and it is at least equally as curative in the constitutional symptoms; certainly also less harm has been done by chrome than mercury, but this is partly owing to the difficulty of getting in excessive doses owing to its strong emetic power, for in some of the chrome-workers we find a serious

cachexia. Still, the strong action on the stomach forms a natural barrier against medicinal abuse, so we may accept the decision that in all cases we should begin with chrome as a practical hint of importance. Güntz particularly notices that, owing to the above harmlessness of chrome, it is to be preferred for an anti-syphilitic course in pregnant women; also in children with congenital syphilis; also in persons about to marry who formerly had syphilis, who, for slight remains of it, or for fear that the disease was not eradicated, desire anti-syphilitic treatment, a course of chrome should be preferred to one of mercury.

Guided by the homœopathic law we are not so helpless as to the *a priori* differential diagnosis of the specifics, and by the careful comparison of the pathogenic symptoms we can often decide whether to choose mercury or chrome, but still in many cases we cannot define that qualitative something which distinguishes the different varieties, and finer modes of discrimination of the pathogenic symptoms are still to be desired.

On the theory of the cure of syphilis by chrome.—Güntz thinks that by the thousandfold experience of cure of syphilis after chrome administration that the specific curative power of that drug is sufficiently proved on the principle of *post hoc ergo propter hoc*. Apparently he forgets the other ingredients of the chrome-water to which the *post hoc* applies equally. Still, admitting there are other grounds for accepting the specific action of chrome, he elsewhere allows that neither it nor mercury nor any other drug can be a universal specific against all forms of syphilis, and therefore he seeks for theoretical grounds to explain the action of chrome, and justify his choice of it for the long and persevering series of experiments with it on patients. He first notices that the roborant treatment of the low and anæmic state caused by syphilis is best met by oxygen-bearing substances and by oxygen itself, quoting a case by Dr. Birch, where a broken-down syphilitic subject was cured by oxygen inhalations. But as inhalation is difficult to apply in practice could we not give it in the oxygen-carriers such as iron, manganese, and chrome? Unfortunately, iron has been found not only useless, but positively hurtful in syphilis; manganese is not so hurtful, but not more useful. So there remained chrome, and as he had heard (we shall see presently where) that it had also a good specific action against syphilis, he thought it might be tried, and that its action on the blood as an oxygen-carrier might explain its action. This is not very clear, and although certainly under chrome improved nutrition and blood formation take place curatively, still he finds something else wanting for explanation, so he looks among the chemical relations of chrome to the proximate principles of the body, and finds that "certain chrome compounds have the well-known property of forming insoluble compounds with gelatine and the gelatinous tissues. A well-known cement for porcelain and glass is of this nature. This fact was for me the bridge between the old and the new; it formed the guiding idea which caused me consistently to exhibit chrome in syphilis. That is what gives the answer to the question often put to me, how I came to give chrome in syphilis. Just as quicksilver can be traced into certain well-known double compounds derived from the decomposition of the albuminous principles of the body, and thus is naturally explained the favourable action of it in syphilis, so can a comparison be made with the action of the chrome compounds." He then appeals to the fact that chromic acid and the chromates are good for hardening anatomical and microscopical preparations, no doubt owing to their fixing solid insoluble compounds with gelatine. Also in the living body the chromates, when applied strong to syphilitic products, cause infiltration and indurations, which are nothing, he thinks, but combinations of chrome and gelatine. He concludes: "While the conditionally favourable action of mercury against syphilis depends on a cautious utilisation of its cell-killing and albumen-breaking-up properties, so it appears to us that the utility of the chrome depends principally on its relation to the gelatinous tissue, and in the conservation of the substance." It is unnecessary to waste words in the criticism of such a futile and ridiculous theory as this, and indeed all chemical theories, which rest on the relation of chemical substances to the mere dead formed-material of the living body. It is obvious, at a glance, that if the above has any meaning, fifty other things should cure syphilis quite as well as chrome, and if mercury cures in quite a different way, why should not 150 other things do the like? The truth is, the real reason of our author's adopting chrome was what is hinted at above, viz. he was told it was specific; and the source of his information was the

same which had been so fruitful in medical discoveries for the last two decades, *i.e.* the homœopathic school. At the beginning of his book Güntz, after referring to Gmelin's experiments, notices mine in 1843, and afterwards more fully the homœopathic proving of Arneth published in the *Austrian Journal of Homœopathy*, vol. iii. In these occur the anticipation of the probable specificity of chrome in syphilis, and also some confirmation of that *ex usu in morbo*. On this Güntz says, "After the publication of these researches, the bichromate was for a time brought into use against the phenomena of syphilis." If he had taken the trouble to keep up with the literature of the homœopathic school he would have seen that the successful use of it is kept up till the present time, although it is not difficult to see why our example has produced so little effect on general medicine. Doubtless, however, the facts impressed themselves on the mind of Güntz and were the main reason for his choice of chrome as a new specific for syphilis. It is to be presumed that after such a body of evidence in its favour as is now furnished by Güntz it will be ere long universally adopted, but even his own first recommendations of it, twelve years ago, met with no response in the medical world (*sind spurlos in der literatur verhallt*).

Nor does the curative action of chrome find any better explanation in the parasitic theory which is now so much in vogue, and which many are inclined to extend to syphilis. It is assumed that if the disease depends on infestment with a specific micrococcus or other independent organism, acting as a parasite, a rational explanation would be given of cure if the chrome simply acted as a specially powerful poison to the micrococcus, destroying it or preventing its growth and multiplication. Now, it is a possible hypothesis that if the micrococcus of syphilis (if such there be) differs, as it must do, specifically from other micrococci, some anti-parasitics may be specially inimical to it, and more so than their power against ordinary putrefactive bacteria, *i.e.* their antiseptic power, would seem to warrant. But it cannot be very much greater, for it requires an appreciable quantity of antiseptics to kill bacteria of any kind, or to stop protoplasmic action, and the margin between the best and the worst antiseptics is not so very great. Now, if the dose of bichromate sufficient to cure syphilis is out of all proportion smaller than that of any known antiseptic, it will be a strong proof against the parasitic theory and any explanation founded on it. According to Güntz, the ordinary dose required for the cure of syphilis is about half a grain a day. This diffused through the body of an adult man would give the proportion of antiseptic as about $\frac{1}{2.000.000}$th. But in the table of the relative power of antiseptics given by Horsley,* the highest on the list is mercuric chloride, of which it requires the $\frac{1}{20000}$th. Chromic acid, and in a less degree the bichromate, are certainly strong antiseptics, but inferior to the mercuric chloride, and the difference of dose is here far too wide to allow of the probability of any parasite-destroying power. Even if we suppose the whole dose to remain dissolved in the blood, calculating that at 6 lbs. would give a proportion of $\frac{1}{84000}$th. But on this point we have some positive data furnished by Güntz, viz. in a patient who had "for a long time" taken one grain of bichromate daily, he drew 420 grammes of blood; this on careful analysis yielded not a trace of chrome. So the metal must pass rapidly from the blood to the solids, and thus is diffused into the larger mass, to be eliminated at a time and in a manner as yet unknown. But there is is no proof that it accumulates anywhere in an active form till the quantity is big enough to kill micrococci, and the good health the patients enjoy at once, after a long course of chrome-water, is in favour of the contrary supposition that it is more or less quickly eliminated. The same arguments are equally against its acting as a mere destructive agent of Beale's graft-germs under the theory which supposes the syphilitic poison to be living degraded bioplasts, which are transplanted from a syphilitic subject to a healthy one, and there grow and multiply by subdivision, the theory being that all the syphilitic bioplasts are the direct descendants of those which were introduced as the contagium. Cure would therefore mean the destruction of the syphilitic bioplasts just as in the cure of parasitic micrococci. From what we know of the power of antiseptic agents in killing protoplasm masses such as white corpuscles and pus corpuscles, quite as large doses are required as for micrococci, so the same argument applies here, and it would require a dose to kill the syphilitic bioplasts which would certainly kill the man himself.

* *Local Government Board Report*, 1881-2, p. 269.

It appears thus that neither the parasitic theory, nor the chemical theory, nor the graft-germ theory as interpreted by Beale, can explain the specific power of chrome in the cure of syphilis, so we must refer it to its action as a specific stimulus and modificator on the living matter itself. We must, I think, consider syphilis to be a diseased action of the living matter of the subject itself involving the proliferation of morbid, infective, bioplasts from it, and not merely the growth and multiplication of extraneous living bioplasts or cocci sojourning in the subject, and that cure consists not in destruction of these, directly at least, but in a twofold influence 1st, that of a similar medicinal stimulus which, acting on the healthy protoplasm, exhausts the susceptibility to the infective stimulus or contagium, thus hurrying on the stage of immunity and setting bounds to the extension of the disease; and andly, in restoring the diseased living matter to health, by virtue of a specific action exercised by the medicine on the diseased parts, which counteracts the syphilitic disease. We can, of course, not be expected to explain or understand the ultimate nature of the action of a specific stimulus and modificator in curing a specific disease, seeing that all vital processes are as yet inscrutable to the eye of science. But it would be a sufficient explanation if we knew a fixed relation which the action of a specific curative medicine on the healthy body bears to the disease. Now, if we know, as a general rule or law, that this is similarity, or that any medicine has the power to cure any morbid state to which it can produce the pathological simile in health, then a reference to that law, or in other words the homœopathic law of specifics, may be justly held to be a sufficient explanation, although we cannot follow the mechanism of the vital changes in the protoplasm which take place when a specific medicine counteracts and extinguishes, when already present, the simile of its own pathogenic action.

Topical Use of the Chromates.

Dr. Cumin, of Glasgow, writes (in the *Ed. Med. and Surg. Journ.*, Oct., 1827, p. 295), "I began to prescribe a saturated solution of the bichromate as an application to tubercular elevations, excrescences, and warts. In these cases the new growth has sometimes been removed by absorption without any slough, but where a slough has formed it has always served to hasten the cure, and in no instance have I observed it to be followed by a deep or unmanageable ulceration. In a case of warts more extensive and formidable than any I had before met with or seen delineated, which I treated last winter, the bichromate in solution was the only remedy which acted effectually, without causing such intolerable pain as to preclude the continuance of its application."

According to Hauche (*Rieck. N. Arzneimittel.*, § 427, quoted by Arneth) this medicine is useful in removing syphilitic excrescences without ulceration or the formation of an eschar. It is said also to have hastened the cicatrization of ulcers, and to have been useful in scrofulous sores and cancer of the uterus.

Jacobson reports good effects from the use of the neutral chromate in old and callous ulcers, in herpes and tinea, and in some inflammations and ophthalmias. Also maculæ are removed by it. He holds the neutral salt to be a far more certain medicine than the acid salt. In ulcers he uses a solution of one drachm of the neutral chromate in ten ounces of water, with which he pencils over the ulcer or the herpes every second or third day. On the ulcer, after a few applications, there shows itself a slight soft crust, after which good granulations make

their appearance. A herpes disappears, according to him, without any marked symptoms, or there appears a slight scaly efflorescence, after which the herpes disappears.

Jacobson also reports that he has found it useful as a corrosive in fungosities, excrescences, and nævi, in herpetic eruptions, impure and callous ulcers, and as a discutient in zona and pustulous ophthalmias. He wishes it should be tried in ophthalmia neonatorum and O. Egyptica. As regards the internal exhibition of it he would often prefer it to Tartar emetic as an emetic in doses of two to four grains, because it does not act so powerfully on the intestinal canal. He recommends it also to be used as a nauseant and alterative, as the constitution can bear the use of it for several weeks in the dose of a quarter to a half-grain four times a day. He concludes with the remark, "It might be administered in diseases in which antimony, zinc, bismuth, copper, &c., are used, and therefore may be tried in croup, as well as in cholera."

As a caustic.—Del. and Hil. state that the chromates have been tried as escharotics for the destruction of syphilitic vegetations, but the terrible consequence of their absorption has caused them to be almost abandoned. This is not the opinion of many other practitioners, for Nélaton used the bichromate in a case of framboesia of the scalp. Frédéricq found that the saturated aqueous solution caused prompt absorption of syphilitic vegetations and mucous papulæ, while warts were more slowly cured. "It would seem," he says, "to check the formative and increase the destructive processes in the living structures." —*Med. Circ.*, August, 1862.

Topical and Escharotic Uses of Chromic Acid.

This was first employed in surgery by Dr. Ure in 1845 (*Med. Gaz.*, p. 787) on account of its powerfully oxidising properties. When rightly managed he found that so soon as its erosive action was finished it passed into the state of inert pulverulent sesquioxide. The energy of its action on animal tissues is great, and it dissolves them entirely. "Heller found that at a moderately high temperature, the acid very readily dissolved any animal tissue; indeed, mice and birds immersed in it completely disappeared within fifteen or twenty minutes, so that no traces remained even of their hair, feathers, bones, or teeth" (Stille). When used as an escharotic, according to Heller, "it first renders the skin yellow and then brown, and finally bluish black; an elevated eschar then forms, one or two lines in thickness, which becomes detached in from twenty-four to forty-eight hours."

It was used by Ure and Heller for the destruction of hæmorrhoids and condylomata. In 1857, John Marshall employed it with success in syphilitic and gonorrhœal warts and condylomata, as illustrated by the following cases. In the strength recommended by him, Marshall says it does not burn nor permanently stain linen.

In a syphilitic subject, numerous warts on nymphæ, margin of

vagina, raphe, and verge of anus; some sessile, some pedunculated, deep red and vascular, others paler and with a thick epidermoid covering, but all exquisitely tender. After excision and various caustics, they had always recurred, and the patient refused to submit to any further operation; a solution of chromic acid was applied successively, a few warts being touched at a time, followed by free ablution, and then dry lint. Within about ten days they were all removed, and did not grow again.

In a case of gonorrhœa and balanitis, a dense crop of highly vascular warts, which were removed permanently by three applications of the solution, at a week's interval.

A man with indurated chancre near the frænum, and an abundant crop of warts on all the parts within the prepuce; topical application of the chromic acid solution and mercury internally; the chancre healed up, and the warts were permanently removed. Numerous similar cases are given by Mr. Marshall. The formula ultimately adopted was 100 grains of crystallized chromic acid to one fluid ounce of distilled water. It is applied with a glass rod or pointed glass tube, and only so as to saturate the diseased growth, avoiding the healthy tissues, and then dress with dry lint; afterwards use a lead lotion.—Marshall, *Lancet*, January, 1857, p. 88.

A large wart on nose and upper lip, reported cured with very little pain by the same, by Dr. Key.—*Lancet*, p. 489, May, 1857.

Isambert employs the chromic acid in the strength of one part to eight of water, as an application in ulcerative affection of the mouth, velum palati, and pharynx. Also in syphilitic ulcers, plaques muqueuses, &c., of the tongue, soft palate, and pharynx; also in epithelial vegetations and small warts of the larynx. Applied to œdema glottidis it immediately withers it up, and relieves the patient.—*Bull. gén de therap.*, lxxxiii, p. 41.

Dr. Cadell confirms Mr. Marshall's experience, and disagrees with Berkeley Hill as to the painfulness of the application, saying that "the use of chromic acid makes warts on the genitals disappear with marvellous rapidity, and the pain from it is markedly less than after the use of any of the other numerous escharotics I have tried." He recommends it to be used by means of some cotton wool, tightly rolled round the end of a pair of artery forceps. He uses the solution of 100 grains to the ounce of water.—*Edin. Med. J.*, April, 1883.

For common warts, "chromic acid 1 to 1 of water, is by far the best remedy. The skin round each wart is first protected by painting with oil, and then the wart soaked with the solution of chromic acid." —*Practitioner*, Sept., 1881, p. 190.

Hairion employed it to destroy the inodular or cicatricial tissue, which exists after loss of substance in the conjunctiva. According to Busch, it allays itching remarkably. Caussade, of Bordeaux, employed it successfully "to destroy enormous vegetations of the vagina, cervix uteri, and labia. These excrescences followed a leucorrhœal discharge which was not associated with any evidences of syphilis, and in a fortnight the cure was rendered complete by the application of a solution of one part of chromic acid to three of distilled water. This disease

occurred in a pregnant female who, a week after her cure, was delivered without accident of a healthy child" (Stille). Its use in granular ophthalmia, stomatitis, &c., is already given.

Directions for the Use of Chromic Acid as an Escharotic.

"The acid should be applied by means of a glass rod or spatula to the diseased surface only, and great care taken to protect adjacent soft parts by means of adhesive plaster or compresses. Its strongest action is obtained by the addition of so much water only as may be necessary to form a thick paste. Any superfluous acid may be removed by a piece of wet lint. A piece of the same material dry is the best dressing after cauterisation" (Stillé). Weaker solutions, as 100 gr. to Aq. ℥j (Marshall's) may be applied by a glass brush.

NUX VOMICA.

BY

FRANCIS BLACK, M.D.

STRYCHNOS NUX VOMICA.

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1. *Nat. Order.*—Luridæ, *Linn.*; Apocyneæ, *Juss.*, *De Cand.*; Pentandria Monogynia. *Fig.* Hamilton, *Flor. Hom.*, xliv.

Hab.—Various parts of India, Ceylon, and the Eastern Archipelago.

Foreign names.—*Fr.*, Noix vomique. *Ital.*, Noce vomica. *Ger.*, Krähenaugen, Brechnuss. *Dut.*, Braaknooten. *Dan.*, Broeknod. *Hind.*, Koockla.

It is a middling-sized tree, bearing a large round smooth berry, about the size of an orange, having a hardish, rich orange-coloured shell. This shell when ripe is full of a white, soft gelatinous pulp, in which are several seeds attached to a central placenta.

These seeds and the bark are the portions used medicinally and in the preparation of strychnia.

These seeds (*Nuces vomicæ*) have two coats, an outer fibrous one covered with short silky hairs, and an inner thin one enveloping the nucleus, which is composed of two parts, the albumen and embryo. Pereira remarks that, unlike most seeds, the albumen of Nux Vomica is of a poisonous nature. The seeds are hard, round, peltate, about an inch in diameter, nearly flat, or very slightly convex on one side and concave on the other; they are surrounded by a fibriform annular stria. The interior of the seed is white and translucid, sometimes dark and opaque. The taste of it is acrid and intensely bitter. The bark of *Strychnos nux vomica* has also been described under the name of false angustura bark.

The bark was formerly confounded with angustura or cusparia bark, and described as *false angustura bark*. Pereira says the origin of this confusion, as explained by Batka, is, that a quantity of it was imported into England, and not being saleable was sent to Holland; and as no better means of getting rid of it offered, it was mixed with and sold as genuine angustura and cusparia. This fraud led to so many cases of poisoning that in various parts of Germany its sale was prohibited. In 1837 O'Shaughnessy established the identity of false angustura bark and the bark of the Nux Vomica tree. In German works the bark also appears under the name of *Lignum colubrinum*, which, however, though not frequently, may be derived from the *Strychnos colubrina*, a native of Malabar. It is now not met with in commerce.

2. *Chemistry*.—The bark and the seeds were found in 1818 by Pelletier and Caventou to contain an active principle which they called Strychnine, and in 1819 they added another named Brucine. These substances are also procured from the *Strychnos ignatia*, *S. colubrina*, and *S. tieute*.

3. Strychnia, $C^{24}H^{22}N^2O^2$, is a white, colourless, intensely bitter, crystalline substance, having the form of an octohedron or four-sided prism. It is almost insoluble in water, one part of strychnia requiring 6500 parts of water at 50°; it requires 2500 parts of boiling water to dissolve it; it readily dissolves in boiling diluted alcohol, in benzine, and chloroform. The crystallisable salts of strychnia (for example, the nitrate, $C^{24}H^{23}N^2O^2HNO^3$) are more soluble.

The proportion of strychnia contained in Nux Vomica varies from 0·2 to 0·5 per 100. The alcoholic extract of Nux Vomica, as ordinarily sold, is considered as about six times less active than strychnia, and this proportion depends on the quality of the Nux Vomica, which varies much in its richness in the alkaloid. For pharmaceutic purposes the yield of strychnia is greater from the *S. ignatia amara* than from the *S. nux vomica*.

4. *Brucia*, $C^{23}H^{26}N^2O^4 + 4H^2O$, exists in the seeds of *S. nux*

vomica and in St. Ignatius' bean. In the former it is combined with gallic acid, in the latter it is associated with strychnia in combination with igasuric acid. Its taste is less bitter than that of strychnia. It is soluble in 850 parts of cold and 500 parts of boiling water. It is very soluble in alcohol, but is insoluble in ether and the fixed oils. Nitric acid assumes a fine red colour when added to brucia. Its salts are readily formed by saturating dilute acids with the alkaloid.

The other constituents are igasuric or strychnic acid, a reddish and a yellowish colouring matter and resinous substance. It is rare to meet with brucia unmixed with strychnia.

5. *Characteristics of the seeds.*—Powdered Nux Vomica has a fallow-grey colour, a bitter taste, and an odour like that of liquorice. Strong nitric acid communicates to it a deep orange-yellow colour. Alcohol causes a precipitate of gum. Acetate and diacetate of lead cause abundant precipitates of gummate and igasurate of lead, with colouring and fatty matter.

Nux Vomica is sometimes met with in a rough rasped state. The difficulty of reducing the seeds to powder is much diminished by exposing them to steam in a close vessel and then drying them. If the powdered nut is boiled for a few minutes in distilled water it presents a yellowish, opaline, bitter infusion, which on the addition of an infusion of galls yields a yellowish-white precipitate, which concentrated nitric acid converts soon into a deep red. If the precipitate, thrown down by the tannin, is mixed with litharge or lime, and added to boiling alcohol, this evaporated yields the reactions to the ordinary tests for strychnia and brucia.

5*a*. *Ethyl and methyl compounds of strychnia and brucia*, according to Crum Brown and Fraser's able researches, while retaining the ordinary chemical reactions of the latter, present completely altered physiological actions. They experimented with iodide of methyl-strychnium, sulphate of methyl-strychnium, and with the nitrate and hydrochlorate of the same base, and likewise with iodide and sulphate of methyl-brucium. These compounds do not excite tetanic convulsions, but produce general paralysis of the body, acting like curare. In their action on the heart and muscles they also differ; after methyl or ethyl compounds the heart continued to contract naturally for a long time, while the muscles for many hours remained flaccid, contractile, and alkaline (23, p. 601).

6. *Chemical tests of strychnia uncombined with organic matter.*—A minute portion is placed on white porcelain; to this is added a drop of pure strong sulphuric acid, then mix the acid and alkaloid thoroughly with a glass spatula. No change of colour takes place, or, if it contain brucia, a faint rose tint. Near this acid mixture place a speck of bichromate of potash, and then bring the liquid and the reagent together with the point of the spatula, having previously placed the porcelain in a favourable light. At the point of contact a deep rich blue colour makes its appearance, and on stirring the reagent into the acid solution extends through the whole liquid, which soon changes to purple, from purple to crimson, from crimson to a rich red brown, and then gradually fades into a bright red, which colour it retains for

several hours. Proceed in the same manner with ferricyanide of potassium. Proceed in the same manner with permanganate of potash. Similar colours appear. The most delicate test is the permanganate of potash (Guy and Ferrier, edit. 5, 1881, p. 563). There is also the galvanic colour test and test of sublimation.

7. *Combined with organic substances.*—It is separated from them by the Stas-Otto process (vide Gray and Ferrier, p. 396). Chloroform and benzole are better solvents than ether.

Strychnine may be separated from beer containing it by means of animal charcoal.

Strychnia undergoes no change in the human body, and putrefaction does not cause its decomposition, so that if present it can under these circumstances, if in sufficient quantity, be generally detected by skilfully conducted chemical research, but the testing for it requires great and constant practice. These tests may be further confirmed by the physiological test. Tardieu regards the organism of a living animal as the most delicate reagent, and the frog as the most sensitive and convenient subject for experiment.

8. *History.*—It is supposed that our knowledge of Nux Vomica is derived from Arabian writers, but it is highly improbable that the nut which they describe under the name of "*Deschawz elkali*," and which Serapion in his translation denotes as a nut that "*movet vomitum*," is the same as the *Strychnos nux vomica*, for the former is described as emetic and purgative, to be given in two-drachm doses, a direction irreconcilable with the properties of the latter (Stillé).

9. Early writers, such as Poinet and Bonetus, supposed it to be poisonous to quadrupeds, but not to man, and Lerney even positively confirms this statement. There are dissertations on its effects by Seuter in 1691, by Lossius in 1683. Montinus mentions its use among the Laplanders (10, p. 221), and Murray has collected four cases of poisoning. Matthiolus mentions the case of a woman who died from eating cheese which had been scraped with a file used for rasping Nux Vomica. He also experimented on dogs and wolves (*Comment. in Dioscor.*, p. 224).

In 1677 Wepfer and Brunner made a few experiments with it on animals, but it was not until the beginning of this century that the subject was treated scientifically, first by Desportes (*Thèse inaugur.*, Paris, 1808, No. 54), who also pointed out its activity to be dependent on a "*principe jaune amer*," and then by Magendie and Raffenau-Delille. They extended their experiments to ignatia and upas tieuté, and found that all the three had similar actions which were manifested on the spinal cord, and by tetanizing the respiratory muscles caused death by asphyxia (5). Orfila, Segalas, &c., have also contributed to a knowledge of its physiological action.

10. But prior to this Samuel Hahnemann, in a paper communicated in 1796 to *Hufeland's Journal*, gave a short but clear and accurate picture of the action of Nux Vomica. This pathogenesis he enlarged in his *Fragmenta de viribus medicamentorum positivis*, 1805, and later in his Materia Medica (1811—1830). The picture he gives in the last is very full, but its value is in some measure

diminished by the artificial mode in which the symptoms are divided and arranged.

Of late years numerous cases of poisoning, and the trials they led to, especially that of Palmer for the murder of Cook, various experiments on animals, the works of Christison, Harley, Taylor, Vulpian, Gallard, and Tardieu, have all contributed to make the pathogenetic action of Nux Vomica and its alkaloids one of the best known in the Materia Medica.

Nux Vomica was discovered in 1818 by Pelletier and Caventou to contain strychnia and brucia. They further showed that these two alkaloids were the active constituents also in the *Strychnos Sancti Ignatii*, the *S. colubrina*, the *S. upas tieuté*, the *S. guianensis*, and *S. potatorum*.

In 1880 M. Pierre, Director of the Botanical Gardens at Saïgon, Cochin, drew attention to another species which he styles *S. gautheriana*, and Baillon refers it to *S. javanica*. The powdered bark of this tree is called Hoàng-nàn. It contains in 100 grammes 2 gr. 70 of brucia, and only a trace of strychnia (*J. de Thérap.*, 1880, vii, p. 111). In the other varieties the latter is much in excess of the former.

11. *Therapeutic history.*—From the 16th to the middle of the 18th century Nux Vomica was occasionally but timidly prescribed by various physicians in Europe; after that date it came into more general use, and the discovery of strychnia seemed to increase its employment. The list of diseases in which it was given successfully, as furnished by Murray, in his *Apparat. Medicaminum*, is curious as illustrating how much of it was specific and embraced by the indications of the homœopathic formula. He mentions mania, hysteria, hypochondria, hemicrania, chorea, and that it formed the principal ingredient in an electuary, called Oro, which was vaunted as a specific in hydrophobia (1). Buchner, and after him Junghanss, 1770, prescribed it with success in hypochondriasis and hysteria. For the latter disease it was considered a domestic specific by women in some parts of Sweden, and the knowledge of this led Sidren to use it successfully, in from 5 to 8 gr. doses, in the treatment of various nervous and convulsive affections. In the experience of Alston 2 to 8 gr. given to maniacs produced sleep which was unattainable with opium. To these instances, quoted from Bayle (ii, p. 134), may be added a case which he gives from Thebasius where this drug afforded great relief in a case of delirious hypochondria occurring periodically.

12. Hagstron, as early as 1772, gave it, with success, in scruple doses, in epidemic dysentery. Odhelius, 1774, records a similar experience, which was confirmed by Hartmann and Dalberg, 1775, but the latter found doses of from 10 to 12 grs. twice a day quite sufficient.

Hufeland employed it in a severe epidemic of dysentery which was very prevalent at Jena, in 1795. Of ninety cases, which were treated in hospital, eight died. He attributes the success of his treatment to the use of Nux Vomica; "I can assert," he says, "that when it was given in time no patient died" (*Hufeland's Journ. der pract. Arzneikunde*, i, p. 76). At the present time Nux Vomica and strychnia are not

much in vogue in acute dysentery; their employment being principally confined to chronic intestinal catarrh attended with much tenesmus. In these cases the specific effects of the drug are well indicated, as also in conditions of constipation and hæmorrhoids.

13. The varied specific uses of Nux Vomica, in certain gastric and stomach disorders, which for long were confined to the homœopathic, are now happily shared by the ordinary schools, and their increasing use is much due to the clear directions given by Dr. Ringer (23, p. 596). It is historically interesting to note the doses then (1796) successfully given by Hahnemann, and of these there is further evidence in his treatment of asthma. He published the radical cure of several cases of asthma with Nux Vomica alone, in doses of four grains given twice a day (*Hufeland*, loc. cit., v). Gradually, experience teaches him that much smaller doses, in cases where it is rightly selected, produce relief without the production of physiological symptoms, and the experience of the present day shows how much benefit may be derived from a range of from one to at most six drops of the tincture to the infinitesimal doses recommended by Hahnemann in his riper experience.

14. In various forms of intermittent fever Nux Vomica and the allied roots of ignatia and colubrina were held in great estimation; but though still employed occasionally in the specific school, they have here, but especially in ordinary practice, lost favour in comparison with quinine and arsenic.

15. The discoveries of Magendie and Raffenau-Delile as to the spinal action of Nux Vomica led Fouquier to make an extensive trial of it in paralysis, and his success and recommendation of its utility induced many to administer the drug. In England, Bardsley was one of the first to publish observations illustrative of the efficacy of this new remedy (8). But time soon tempered the enthusiastic employment of Nux Vomica, and showed that its use was often positively useless and occasionally dangerous in paralysis depending on cerebral lesions, and gradually limited its administration to those cases which were considered to be of a rheumatic, gouty, hysteric, scorbutic character, or due to lead influences. Again, time and a better knowledge of the pathology of paralysis have much restricted its employment, and its place has been taken by various electric appliances. Lately its use has has been recommended by Brown-Séquard in cases which he describes as "reflex paralysis," and at present its hypodermic employment is gaining favour with surgeons in amaurosis and anæsthesia of the retina, when there is no material lesion. Its former use in epilepsy has also been much restricted, also its employment in chorea, for which Trousseau considers it a valuable remedy, and to some forms of which it has a specific relation.

16. To Hahnemann is undoubtedly due the credit of having recalled the attention of physicians to the important action of Nux Vomica in stomach and intestinal disorders, and this he effected by giving them a rule as to the manner in which the selection was to be made. In his first paper on the "Actions of Drugs" (1796) he writes:

"As it [Nux V.] excites, besides vertigo, anxiety, and febrile rigor, a kind of delirium, consisting in vivid, sometimes frightful visions, and

tension in the stomach, so it once quickly subdued a fever in a laborious reflective mechanic in the country, which began with tension in the stomach, followed by a sudden attack of vertigo, so as to make him fall, that left behind it a kind of confusion of the understanding, with frightful hypochondriacal ideas, anxiety, and exhaustion. In the morning he was pretty lively and not exhausted, but in the afternoon, about two o'clock, the attack commenced. He got Nux Vomica, in increasing doses, one daily, and improved. At the fourth dose, which contained seventeen grains, there occurred great anxiety, immobility, and stiffness of the limbs, ending in a profuse perspiration. The fever and all the nervous symptoms disappeared, and never returned, although for many years previously he had from time to time been subject to such attacks suddenly occurring, yet unaccompanied by fever.

"Its tendency to cause cramps in the abdomen, anxiety, and pain in the stomach, I availed myself of in a dysenteric fever (without purging), in persons living in the same house with dysenteric patients. In these cases it diminished the feeling of discomfort in the limbs, the feverishness, the anxiety, and the pressure in the stomach: it produced the same good results in some of the patients, but as they had simple dysentery without diarrhœa, it made the evacuations still rarer, from its tendency to cause constipation. The signs of deranged biliary secretion showed themselves, and the dysenteric evacuations, though rarer, were accompanied by just as much tenesmus as before, and were of as bad a character. The symptom of loss of taste, or perverted taste, remained. Its tendency to diminish the peristaltic movements was therefore disadvantageous in the true simple dysentery. In diarrhœas, even such as are of a dysenteric character, it will be more serviceable, at least as a palliative remedy. During its employment I witnessed twitching movements under the skin, as if caused by live animals, in the limbs, and especially in the abdominal muscles" (*Hufeland's Journ.*, loc. cit.).

It is now a recognised remedy in cardialgia and gastrodynia, and of much use "in so-called hysteria of middle-aged people, controlling in them flatulence, heat and weight at the top of the head, and it often removes effectually, though less surely, flushings of the face and hot and cold perspirations" (Ringer, 1882, p. 601). These specific uses of Nux Vomica and its alkaloids are those which Hahnemann nearly a century ago pointed out as indicated by the pathogenesis of the drug.

17. The action of Nux Vomica is so similar to that of brucia and strychnia, though differing quantitatively, that the information, derived from experiments with the latter, may, for all practical purposes, be employed in illustrating the pathogenesis of the former.

As the references throughout will be to strychnia, and not to brucia, the action of the latter may now be briefly considered. Its effects are very analogous to strychnia, only according to Magendie twelve times, and according to Andral twenty times less active. According to later examinations by F. A. Falck, of Marburg, nitrate of brucia has a toxical power 38⅛ less powerful than nitrate of strychnia.

According to Vulpian the first spasms excited by brucia are less tetanic than those of strychnia, but soon they are identical (24, p. 601).

Brucia forms the active agent in Hoàng-nàn (vide 10), and its action on animals has been investigated by Rabuteau and Pietri (*Soc. de Biologie*, 22 Juin, 1878), and Galippe (*Journ. des connais. méd.*, 1881), with the result of finding it identical with that of brucia prepared chemically.

L. Wintzenried confirms the statements first made by Prof. Monnier, of Geneva, that brucia acts differently on green and on red frogs; causing, from the commencement, in the former paralysis of the motor nerves, whilst in the latter it excites convulsions analogous to strychnia. This peculiarity of difference is shown also in other poisons, such as veratrine, caffeine, pilocarpine (24, p. 604).

18. Nux Vomica acts on all animals, though some are much more readily affected than others, the herbivorous requiring larger doses than the carnivorous. Frogs and human beings are the most sensitive to its influence; cocks and hedgehogs the least. A species of sloth (*cholæpus Hoffmannii*) seems little affected by it; it is said some monkeys enjoy immunity from the poisonous effects of strychnia. Snails are much less sensitive than mammifers; some of the former, weighing without shell 8 to 9 grammes, are not killed by 4½ centigrammes of chlorohydrate of strychnia, whilst a dog weighing 10 to 12 kilogrammes dies after the administration of 4 to 5 milligrammes.

19. *Absorption.*—It acts by whatever channel it is introduced, and rapidly circulates through the whole system. It is absorbed by all the mucous membranes. Absorption takes place more rapidly from the intestinal canal than from the subcutaneous tissue. Even placed in contact with the conjunctiva it has been known to set up alarming symptoms of poisoning (20, p. 1068). It is more poisonous when injected into the rectum than when swallowed, a circumstance not due to the digestive or destructive power of the gastric juice (23, p. 597). It has been detected in infinitesimal quantities in the blood, in minute quantities in the grey substance of the spinal marrow, of the pons Varolii, of the medulla oblongata; in the last it is most abundant (22, p. 662). Dragendorf and Masing detected strychnia in very small quantities in the blood; they also found it in the bile, in the liver, in the kidneys, but never in the brain. They found most in the liver, absolutely and relatively, whence they conclude strychnia lingers in that organ. They detected it in the upper part of the small intestines, but not in the lower portions; they never found it in the fæces nor in the walls of the great vessels (21, p. 807).

20. *Elimination.*—It is eliminated by the saliva and the urine. According to the experiments of Dragendorf and Masing, who introduced a few milligrammes into a dog for several consecutive days, no strychnia was found in the urine until about the third or fourth day, but the excretion of the poison continued for some days after the administration had ceased (Note, p. 662).

21. *Cumulative action.*—It is this slowness of elimination, and the fact that during its daily therapeutic use in small doses tetanic symptoms are sometimes at last suddenly excited, which has led Nothnagel, Von Boeck, and others to consider it has a cumulative effect, and on this account demands caution for its continued use.

Wood states it has no cumulative action; Vulpian does not fear the

occurrence of serious effects, due to accumulation, if the dose be prudently increased; Leube and Rosenthal are of the same opinion, and maintain that by the prolonged use of strychnia the system becomes so habituated to its presence that larger and larger doses may be given with impunity. Taylor considers the system may become habituated to the poison so as to resist the effect of large doses, and he quotes the experience of Pereira in a case where the dose of strychnia was gradually increased until 1½ grs. were taken without injurious effects (14, p. 777). Baker (*Trans. Calcutta Med. Phys. Soc.*, i, p. 138) states that the natives, in some parts of Hindostan, are enabled from habit to take, generally with impunity, large doses of Nux Vomica (vide also Obs. viii).

It is probable that habit here has little effect, for this immunity is probably due to the coarse form and the time at which the dose is taken, which also cannot be increased beyond a nut without danger. Christison does not consider that strychnia has a cumulative effect, or that habit familiarizes the system to strychnia used medicinally. The same dose, which has once excited its peculiar physiological action, will for the most part suffice to excite it again, however frequently the dose may be repeated (p. 901).

22. *Pathogenetic sources.*—The action on healthy persons of doses smaller than in ordinary therapeutic use is difficult to state, for there are no sufficient data. The pathogenesis of Nux Vomica, as given by Hahnemann, does not throw much light on this point. That some of his symptoms result from minute doses is certain, but these are not marked, and are catalogued with many symptoms which arise from the use of therapeutic doses in disease (2, 3, 4).

The very general use of Nux Vomica and strychnia in various diseases diminishes and probably entirely removes the risk of error arising from the pathological condition as a factor, so that the physiological symptoms which present themselves may be safely considered as true and available. This knowledge is confirmed and supplemented by the record of cases of poisoning. Representative cases of these are given at the end of this section and are referred to by Roman numbers.

23. *Action of small doses.*—In small doses (Strych. ·0001—0003 gramme) given for several days increases the salivary secretion, augments, according to some, and does not affect, according to others, the appetite, through its prolonged use causes anorexia and impaired digestion. The urine is increased and passed with more urgency; there is increased susceptibility of the organs of sense, especially of hearing and of vision; the sense of smell is disturbed. Frohlich reports that, when under the action of strychnia, he found repulsive smells, such as of assafœtida, to have a sweet odour (22, p. 663). The general irritability of the nervous system is augmented, shown in restlessness, anxiety, and increased emotional sensibility.

24. *Larger doses.*—If these small doses are continued, or larger ones given from the first, all the symptoms become more marked, and occasionally there is added irritation of the bladder, constant and even painful erections with aphrodisia in both sexes. Sometimes there is confusion of vision, sparks before the eyes, and tinnitus aurium. Sometimes a sense of vertigo is felt, causing the walk to be unsteady;

often a sense of tightness and stiffness in the muscles, especially of the trunk, throat, and jaw, are experienced; often impeded deglutition; also trembling, electric-like shocks, formication, and itching often preceded by shivering. After such precursors appear tetanic attacks, attended by painful anxiety, agitation, fright, palpitation of the heart, and sweating.

Before and during these attacks the reflex sensibility is so increased that the muscles are thrown into a convulsed state by very slight causes; a touch, a deep inspiration, a slight movement will excite them.

25. *Poisonous doses* manifest their influence very rapidly, the time depending on the state of the stomach, whether full or empty, and on the mode of administration.

A poisonous dose of Nux Vomica, if in powder, may be reckoned as from twenty grains and upwards; if in the form of alcoholic extract from fifteen centigrammes upwards. As a general statement, three to five centigrammes may be regarded as a poisonous dose of strychnia. The smallest dose of Nux Vomica known to have caused death is three grains of the alcoholic extract, and of strychnia half a grain. These doses manifest their action in from five or twenty-five minutes to three quarters or even an hour. A young healthy woman took by mistake a grain and a half of strychnia; an hour passed without any symptoms, and in half an hour after this she died (*Lancet*, August 31st, 1850). The results of poisonous doses may be studied in Obs. i to vii. The following case illustrates the action:—

E. S—, æt. 16, took Nux Vomica in order to destroy herself. She was able to walk a distance of two miles to her grandmother's house, where she arrived in a state of great mental excitement. Rushing into the room she seated herself suddenly in a chair, and was seized with a frightful fit.

Mr. Sleeman, who was sent for, thus describes her condition:—"On his arrival he found the patient lying down dressed under the influence of violent tetanic spasms. Her head was drawn backwards, the arms extended, the fingers flexed to the palms, the jaws firmly contracted, the countenance somewhat livid, the eyes open, fixed, and somewhat protruding; the trunk stiff, the legs extended, the feet turned outwards, and the toes flexed to the plantar surface, the skin dry and warm; the respiration loud, almost amounting to stertor; no alvine evacuations took place during the paroxysms or intermissions; the pulse during the paroxysms could not be counted. This paroxysm lasted about two minutes. An interval of perfect sensibility ensued, during which she admitted that she had taken the poison, and expressed her sorrow for having done so, and said that during the fits she suffered much pain.

"A full dose of sulphate of copper was administered as an emetic, but did not produce vomiting. Mr. Sleeman was now about to use the stomach-pump, but a fresh paroxysm prevented it. During the interval between the paroxysms all the limbs were perfectly relaxed, the body pliant, and she was much exhausted; and occasionally, after a paroxysm of more than usual severity, there was a slight tendency to coma. The countenance pallid, eyes natural; respiration natural; pulse about 80, moderately full; skin warm and dry. The paroxysms lasted about two minutes, the intermissions about five minutes when first seen; the paroxysms generally increased in severity, the intermissions became shorter, but when complete, consciousness remained perfect, even to the intermission before the last paroxysm, which terminated the severe sufferings of the poor girl, which took place at a few minutes before two. During the last half hour the slightest movement caused a paroxysm; sometimes even an attempt to speak or drink would cause one. She begged to be left alone because of the pain she suffered, as she herself expressed it, 'when in a fit'" (*Med. Times and Gaz.*, Feb. 9th, 1856).

26. *Action on the cerebro-spinal system.*—The characteristic action of

Nux Vomica and its alkaloids, strychnia and brucia, is not much directed towards the cerebrum, but principally exercised on the spinal cord, the reflex sensibility of which it greatly increases. Magendie was one of the first to call attention to this peculiar action of Nux Vomica on the spinal cord and nerves emanating from it as well as on the muscles those nerves supply. Later on, the experiments of Brown-Séquard have demonstrated that the peculiar action is not cerebral, not muscular, but purely spinal. He showed that when the spinal cord was cut just below the origin of the nerves supplying the forelegs of a frog, and all the blood-vessels going to this lower section of the cord were also severed, so as to isolate the latter, on the exhibition of strychnia convulsions occurred in the anterior part of the body, whilst in the posterior portion a normal reflex activity was maintained. This quiet existed although the blood was carrying the poison to every part except to the spinal cord (*Comptes Rendus de la Soc. de Biologie*, 1849, p. 119).

27. That the spasmodic phenomena are not due to a paralysis of the reflex centres situated in the brain is shown by their free occurrence in decapitated animals. The action does not originate from the centre, but from reflex influences ; it is due to increased reflex irritability of the medulla oblongata and spinal cord.

28. *Action on medulla oblongata and spinal cord.*—Flourens and S. Mayer considered that strychnia, and plants containing it, acted primarily on the medulla oblongata, but Freusberg has shown that Meyer drew his conclusions from administering strychnia immediately after separating the spine, that is during the time when animals suffer from the effects of the section ; whereas, by waiting for a few days after the operation, he showed that the convulsive action of strychnia took place in the posterior as well as in the anterior parts of the animal (22, p. 664).

The ganglions in the grey substance of the medulla oblongata, of the spinal cord, and those of the vaso-motor and respiratory system, also the intermediary reflex ganglions have their excitability much increased.

Strychnia does not merely heighten the reflex action of the cord, but so affects it that impressions are not confined within their natural limits, but diffuse themselves throughout the cord ; it lessens the resistance of the cord and increases the diffusibility of impression (23, p. 399).

Cl. Bernard supposes that Nux Vomica and its alkaloids destroy the functions of the sensory nerves by over-exciting them, and this condition of the nerves of sensation has a similar effect on the motor nerves (25, p. 312). Vulpian demonstrates by experiments on frogs and dogs that strychnia does not act as a poison on the sensory nerves, that it does not destroy their physiological functions, nor affect their central origin (24, p. 475).

Martin Magron and Buisson (25*a*) had previously come to the same conclusion, and that in this respect strychnia resembles curare.

Vulpian has shown that in mammifers killed by strychnia the muscles preserve their mobility even after most violent spasms, so that he considers Cl. Bernard wrong in stating that muscular mobility is lost and that this is owing to the previous excitement of the nerves of sensation. In frogs, where very large doses had produced apparent

death, the sciatic nerve when exposed manifested a normal or nearly normal mobility. After about twenty-four hours, this condition of complete muscular resolution passes away, and gradually the tetanic stage reappears, and continues from two to four weeks, so that the least movement or touch excites convulsive action.

In mammifers this stage of complete abolition of mobility and apparent death cannot be produced unless very large doses (59 cent.) are injected one after the other into the veins, and artificial respiration kept up. Richet, who performed these experiments in Vulpian's laboratory, found three stages: 1st, tetanic; 2nd, convulsive; 3rd, choreic; after these succeeds the muscular resolution during which no reflex movements can be excited, and the influence of the nerves on mobility is very slight. This stage is simply the prelude to death; it is collapse of the nervous system, and in no way can be considered as demonstrating any paralysing action in strychnia. The sensations of weariness, stiffness, and weight in the limbs are not signs of paresis, but of commencing tetanism.

28*a*. *Sympathetic nerves.*—The action on these is manifested, during tetanism, in dilated pupil, projecting eyeball, marked increase of arterial pressure, modification of the pulse, and from the experiments on dogs, when contraction is excited in the muscles of the intestines, bladder, and spleen, it is probable that all unstriated muscles are the seat of tetanic action, reflex in its character (24, p. 510).

29. *Action through the blood.*—The action of Nux Vomica or strychnia is supposed by Harley to be exercised by changes which are produced in the blood, the inability to respire oxygen modifying the condition of the spinal cord. He has shown that air which has remained for some time in contact with blood to which strychnia or brucia has been added contains more oxygen and less carbonic acid than air which has been left in contact with simple blood for the same length of time (12). But there is no evidence that similar results occur during life, except in so far as the excess of carbonic acid is referable to the dyspnœa. Experiments with strychnia on frogs whose hearts are excised and a solution of sodium chloride substituted for the blood show tetanic spasms in the same manner as in frogs whose blood circulation is normal. Spence placed a frog, for four hours and a half, in a vessel containing pure oxygen; at the end of that time the air was so little deteriorated that it caused a spark to burst into flame. The frog was then removed, and after receiving a minute dose of strychnia was replaced in a vessel containing fresh oxygen. In three minutes spasms were developed (*Edin. Med. Jour.*, July, 1866, p. 53).

As the asphyxial condition is very difficult to produce in frogs the experiment of Spence is far from being conclusive, especially as Hermann states that the action of strychnia is prevented when the blood is saturated with oxygen (p. 170). The probability is that in warm-blooded animals the cyanotic state of the blood is a partial factor, but as this condition is common to several poisons it will not of itself explain the special action of strychnia.

30. *Tetanic condition.*—The peculiar action of Nux Vomica is at first expressed in a sense of tightness, of disagreeable oppression of the chest,

even actual dyspnœa, with great anxiety, which is a characteristic feature; sometimes it is a feeling of weight and weakness in the limbs. When more marked all the muscles of the trunk are liable to the tetanising influence, but it is generally slower in attacking and weaker in affecting the diaphragm. Sometimes after taking the drug there is a sense of vertigo and a peculiar stiff feeling in the legs which render walking unsteady. Pereira remarks, "If, when the effect is beginning to be observed, the patient be tapped suddenly on the ham while standing, a slight convulsive paroxysm is frequently brought on, so that he will have some difficulty to prevent himself from falling; I have often in this way been able to recognise the effect of Nux Vomica on the muscular system before the patient had experienced any particular symptoms" (9, p. 1296).

The sensations preceding these are slight pains, and a sense of stiffness is experienced in the muscles of the neck and in those which close the jaw, and a feeling of contraction in the pharynx. The muscles of the chest and abdomen are stiffer and less mobile than usual. These feelings gain in intensity; electric-like shocks throughout the body are experienced; the shocks of the limbs become more and more violent, the bystanders comparing the noise to castanets (20, p. 1072); then tetanic convulsions take place.

31. The first change is a sense of stiffness, then electric-like shocks, shivering and convulsive shaking, sometimes formication and itching.

32. The *formication*, at first deep seated, becomes superficial (Obs. iii). When the spasmodic affection disappears there often remains a most obstinate and intolerable itching; its principal seat is the scalp, but other parts are also affected (Obs. iii, xii; 15, p. 771).

33. *Intelligence.*—During the most severe attacks the intelligence always remains intact until immediately preceding death, when asphyxia may dull the mind. There is always extreme anxiety, and often emotional excitement amounting to hysteria.

34. *Emotions.*—Hahnemann, in his first paper on the curative powers of drugs (*Hufeland, J. der pract. Arzneikunde*, II, part iii, 1796) says it produces attacks similar to hysterical and hypochondriacal paroxysms.

Trousseau says that in addition to extreme anxiety, it sets up sometimes nervous agitation like hysteria (p. 782). In Obs. vii the patient continued in alarm to refuse to let her husband move, and to the question whether she was in pain replied "No, no, no;" in Obs. v she is much excited and hysterical; in Obs. i the patient is in a state of singular agitation, uttered interrupted cries imploring assistance; in Obs. ix there is great anxiety, violent palpitation, and involuntary loud crying out. In the cases of a physician and his wife who were poisoned by each taking two pills (each pill containing two grains and a half extract of Nux V.), both, curiously enough, kept exclaiming "Hold me! hold me!" although there was a person on either side of each. There was also a peculiar hallucination of being fixed to the chair. Dr. T— afterwards told me (Mr. Ley) "that if I had set fire to a bundle of straw under him, he did not think he could have moved," although at the same time he kept crying "Hold me!" (*Med. Times and Gaz.*, January 16th, 1858).

35. *Description of paroxysm.*—The tetanic attack may affect various muscles, especially the extensors; it may show itself in stiffness of the extremities, of the trunk, so that the chest and abdomen are as hard as a board to the touch, in trismus, in opisthotonos with forcible extension of the extremities, the head bent backwards so that the whole body is arched. Emprosthotonos and pleurotonos have been noticed, but these forms are extremely rare (vide case, *Med. Times*, July 6th, 1867, and July 5th, 1860). The respiration becomes more and more impeded, the face from being pale assumes a dark red livid hue, the pupils are dilated, the eyes staring as if they would start from the sockets, palpitation and quick, irregular action of the heart, and the whole body bathed in perspiration.

So great is the increased susceptibility to external impressions that a slight touch, even when unknown to the patient (Obs. v), a slight noise, a breath of cold air, a cough, will excite the paroxysm. Von Boeck remarks that when the patients are prepared for the application of a sensible irritant they suffer no resulting paroxysm, whereas the smallest unforeseen irritation leads to violent tetanic convulsions. Some beg to be rubbed vigorously; this did not induce tetanus, whereas the kick of a foot against the bed produced violent convulsions (21, p. 786).

36. *Duration.*—During these paroxysms the muscles relax, and calm succeeds to the agitation and spasmodic rigidity. This lull is but temporary, another attack comes on, and generally at the end of the fourth or fifth (in some cases as many as ten have been recorded) death in the form of carbonic acid poisoning closes the terrible scene. A false analogy and a superficial observation have, according to Tardieu (20, p. 1076), led writers to describe death from strychnia as that of asphyxiated persons; this statement, first made by Orfila, has been repeated by Devergie, who states that the autopsy reveals all the organic lesions met with in ordinary asphyxia. Tardieu considers this an abuse of the term asphyxia, and he uses the word "suffocation" as expressing the only kind of asphyxia occurring in strychnia poisoning. In addition to his own experiments to settle this point he quotes the additional evidence of Cl. Bernard who, he considers, has distinctly shown that the physiological mechanism of death by strychnia has nothing to compare with death by asphyxia, "or, to speak more correctly, by suspension of respiration by apnœa" (20, p. 1076). In a very few cases death does not arise during the attack but after it has ceased, and is due to collapse, to an exhaustion which follows the initial increase of excitability. The attacks may last from a few seconds to four or five minutes; a case is recorded when the duration was twenty minutes (21, p. 781). The tendency to attacks may continue from a few hours to several days.

37. *Sequelæ of attacks.*—After the attacks there is extreme feebleness, a sensation of being shattered, great physical and moral lassitude, a muscular stiffness, sometimes accompanied by involuntary twitching, in one or various parts of the body for many days. In a few rare cases the muscular weakness has lingered for weeks and even months, but this condition is much more probably due to the previous condition of

the patient, or to the dangerous extent of antidotes employed, such as tobacco and pure nicotine.

38. *Diagnostic marks.*—In traumatic and idiopathic tetanus the symptoms commence and progress more slowly, and are longer in proving fatal than in the tetanic attacks produced by Nux Vomica or strychnia. In the former the paroxysms affect chiefly the masseters, the cervical muscles, the muscles of the extremities, while the respiratory muscles are not much involved, but in the latter tetanus of the respiratory muscles is especially prominent. In ordinary tetanus trismus is usually the first symptom and persists for hours. When it arises from the drug trismus may never be present, and when present it is not persistent, disappearing with the other cramps with which it is always associated.

The drug produces a rigid tremor uniformly continuous throughout the paroxysm, whereas in epileptic, epileptiform, or hysteric convulsions the muscles are alternately relaxed and contracted. This distinction is not, however, absolute, for it happens, though very rarely, that though the prevailing convulsions of Nux Vomica are of a tonic character, yet clonic convulsions are present in a few muscles.

39. *Cerebral action.*—The action of Nux Vomica and its alkaloids on the brain is not so distinctly marked as on the spine, for it remains intact, at least as regards its physical functions. During the most violent paroxysms the intelligence remains unimpaired, except sometimes towards the last, when carbonic acid poisoning dulls the intellect. Any disturbance excited is more emotional than mental (vide 16). The action on the brain is also shown in the occasional occurrence of confusion of sight, modifications of vision, sparks before the eyes, and tinnitus aurium. Spence's experiments show that strychnine applied in dogs to the optic thalami rapidly excites convulsions (16). That there is cerebral action is deduced from the frequent occurrence of trismus, which must be due to the action of the drug on the origin of the motor branch of the trigeminus.

The cerebral action is also deduced from the irritation of brain occasionally set up when it has been given in cerebral paralysis (Andral and Lallemand).

40. *Stupor.*—An appearance of stupor has been noticed by some writers, but very few modern ones. Hufeland notes "stupefaction of the brain" after the administration of Nux V. in an epidemic dysentery, but the severity of the disease, where sometimes there were a hundred motions in the day, may have tended to develop the symptom. Its occurrence mentioned by Bardsley (8, p. 18) was in a hemiplegic case. Von Boeck has met with only one case in which complete unconsciousness of seventy-two hours' duration was observed, but he does not think there was a causal relation between that symptom and the grain and a half of strychnia. In the case of a lady poisoned by repeated doses of strychnia, whose attacks lasted from 25th February to the 1st March, when she died, insensibility appeared for about an hour during the last attack. This was evidently due to carbonic acid poisoning, and not directly to the strychnia (quoted at Palmer's trial). The same explanation applies to temporary unconsciousness occurring in a hemi-

plegic case (reported in *Frank's Mag.*) when 1½ gr. strych. had been sprinkled on a raw surface on leg.

41. *Intoxication.*—This symptom has only been occasionally noticed. Hahnemann enters it from the case of a man who had taken twenty grains Nux V., and half an hour afterwards he felt "the sensation of being drunk, and had a singular stiffness and tension of all the joints, especially the knees, which caused him to stagger in his walk with the fear of falling" (Murray, *Appar. Med.*, i, 709, who extracts it from *Vekoskrift för Läkare*, ii, p. 169).

Baker, describing its effects on natives of Hindustan, who use it freely, says that if taken on an empty stomach it is apt to cause giddiness and a degree of intoxication similar in effect to that produced by cannabis; taken after a meal it does not excite these symptoms.

Anstie, remarking on what he considers the overlooked stimulating action of strychnia in very small doses, describes a case which brought it to his notice (vide Circulation for further report): "On the occasion of the man's first visit, I thought, at first, that he was drunk, as he had the uncertain gait, meaningless smile, and flushed perspiring cheeks characteristic of intoxication. To my surprise, I found that this effect had been produced by a dose $\frac{1}{16}$th gr. strychnia, taken half an hour previously. He had come to complain of the medicine because it made him drunk. When the dose was reduced to $\frac{1}{32}$nd gr. he had no such effects after it" (17, p. 151). Ringer says he was able on one occasion to connect a peculiar wandering delirium at night with the employment of strychnia, though there were no tetanic twitchings (23, p. 601).

42. *Vertigo.*—Slight passing feelings of vertigo are not unfrequent (15, p. 768), but marked vertigo coming on suddenly is a rare symptom. Bardsley noticed it in a case of paralysis of three months' standing, in a temperate young man, who after the third dose of ½ gr. strychnia, was suddenly seized with vertigo and vomiting followed by the tetanic state (8, p. 12). The disease very probably predisposed to this attack. Richter in his experiments with strychnia, applied to a blistered surface in the cases of paralytics, found headache and vertigo to be very rare symptoms, even when the action of the drug was apparent from the tetanised condition of the muscles; disturbance of the brain functions was never noticed (10, p. 246).

Prof. Marc, suffering from a tertian fever, took by mistake three fourths of a wineglassful of an infusion of the false angustura bark; he immediately experienced disturbance and pain in the stomach, but no desire to vomit. In a few minutes he felt symptoms of congestion of the brain, giddiness, ringing in the ears, confusion in the head, inability to move his legs, every effort excited pain, the arms remained free; soon marked trismus stopping articulation appeared. The symptoms passed off in two hours (Wibmer, p. 188).

43. *Headache.*—This symptom is given very fully by Hahnemann and it appears to have been noted by him more frequently than by other observers. According to his account they have the character of being increased after meals, after mental exertion, and motions, and they are attended by bodily and mental irritability. Their site varies

in the various experiments; sometimes a dull or empty feeling or splitting sensation in the head, as after the use of alcohol; or tearing shooting pains, affecting sometimes one side of the head, at others the forehead or the occiput, attended by nausea and vomiting. As described by Hahnemann they may be regarded as of a sympathetic character. In the case of a man suffering from hemiplegia, after 1½ gr. strychnia was sprinkled on a raw service on paralysed leg, in less than an hour he had twitchings which increased rapidly in intensity; boring pain in occiput, vertigo, and noise in ears. The twitchings spread over the whole healthy and paralysed side with increase of headache. At last unconsciousness and asphyxia set in with most violent convulsions so that he was thrown about in bed. The cyanosis was so great that the right lower extremity had a blue marbled appearance. This patient recovered (*Frank's Mag.* i, 105). In this case the cause of the paralysis was very possibly a predisposing factor of headache.

Lembert found when using strychnine endermically that it often caused pain on the same side of the head to which it had been applied (10, v. p. 246).

Von Hippel in his hypodermic experiments with strychnine, to the temples, and one case to the arm of healthy persons, noticed once slight vertigo lasting two or three minutes, but no headache. He, however, alludes to Nagel's experience of its hypodermic use in amaurosis, who records as symptoms pressure and pain in forehead and temples, formication in the limbs and convulsions (19, p. 32).

44. *Action on paralysed muscles.*—Fouquier was the first to draw attention to the now well-recognised fact that Nux Vomica and its alkaloids manifest their tetanising action sooner on paralysed than on unparalysed muscles, and that the former may be affected in a marked manner while the latter show no sign whatever of the action of the drug. He remarks, under his sixteenth case of paralysis, that given in suitable doses it will only exercise its action on the diseased parts. It is not always a marked tetanism; it may be a sense of intense thoracic oppression or a sudden instantaneous thrill; again, it is a sense of heat, an increased sensibility of the paralysed parts; at other times it was formication or painful pricking, or pulsations and drawing (6). When used hypodermically the sense of heat or glow of the skin, felt most in the paralysed parts and down the spine, is of common occurrence.

Various explanations have been offered for this remarkable influence on the paralysed parts; *e.g.* Marshall Hall considers that when the paralysis is cerebral the irritability of the muscular fibre becomes augmented from lack of the stimulus of volition. But this does not hold good in spinal or peripheral paralysis where the phenomena are met with and where volition is intact. To the writer the explanation lies in the circumstance that, as a general rule, healthy tissue resists the action of an abnormal stimulus much more than diseased. St. Clair Gray showed that in frogs $\frac{1}{4000}$th gr. strychnia is sufficient to produce tetanus, but when these animals were insufficiently nourished the tetanus symptoms were produced by $\frac{1}{30000}$th gr. (18).

It has also to be remembered that this action on paralysed parts is only noticeable in those cases where reflex activity exists, and especially

when it is in excess; when absent the palsied is not affected more readily than the sound part. It may be noted, for instance, in paraplegia depending on vertebral disease, where reflex excitability is very great, that if, as sometimes happens, the paralysis improves and there is a return of voluntary movement of the legs, the inclination to reflex symptoms entirely disappears.

Eyes.

45. During an attack *the eyeballs* are prominent and staring, but this is a result of the disordered respiration. To this cause is also due any congestion of the conjunctiva; it is only temporary. The eyeball turned much inwards in an attack is not a frequent symptom; it was associated with the more unusual circumstance of contracted pupil, in Obs. ix.

46. *Pupils.*—The pupils are almost invariably *dilated* and the eyeballs prominent whenever the tetanising influence is sufficient to affect the respiratory muscles. This state of the pupil seems due to the influence of the drug on the sympathetic nerve, for at the same time as the mydriasis occurs the eyelids are widely opened, the eyes protrude and are staring. This mydriatic action is probably increased by the violent muscular action and dyspnœa, conditions which are always accompanied by dilatation, but it is excited by tetanising influences exerted on the longitudinal fibres. This is shown by experiments on frogs and on dogs who are first placed under the influence of curare and then of strychnia. In this way muscular movement and asphyxia are excluded as factors. If the table on which these animals are lying quiet be struck sharply, the above ocular phenomena are at once excited (24, p. 502).

Harley relates the case of a young girl who committed suicide by taking strychnia, and where on raising the eyelids to examine the pupils, which were found natural, a tetanic spasm was excited. The pupils were observed to dilate during the spasm, and to return to their normal dimensions during the intervals. He had in previous cases noted the same condition (*Lancet*, June 14th, 1856, p. 397).

47. *Contracted pupil* during the tetanic attack is a very rare circumstance; it existed in Obs. ix associated with the eyeballs much turned inwards; probably the existence of the latter had some influence on the former.

Contracted pupil also occurred in a man, aged 48, who was admitted into the Clinique of the University of Pisa, for a paralytic affection of the right superior extremity, the consequence of a suddenly suppressed otorrhœa; he was treated with Nux Vomica, which produced a marked contraction of the pupils. But in order to judge decidedly of the comparative effects of belladonna and Nux Vomica, Professor Puccenotti caused to be applied to the eyebrows of the patient an ointment of belladonna over the right one, and an ointment of strychnia over the left one. Two hours afterwards it was observed that the right pupil was widely dilated, the left one strongly contracted (*Annuaire de Thérap.*, 1843, p. 56).

48. *Vision.*—Hahnemann gives, on the authority of Rademacher, the symptom "Objects appear brighter to look at than usual." On turning to the original source it is taken from the case of a man who by mistake took 8 gr. Ext. Nucis Vom., and after trismus and slight formication of the skin, he had increased clearness of vision (Obs. iii). How long this lasted is not reported.

Increased activity and sensibility of vision and hearing have been noticed by others. In some instances there is hyperæsthesia of the retina; some are painfully affected by light and sound. In Anstie's experiment on a dog, the animal shunned the light and sought dark corners (21, p. 211). Anstie considers that the power of hearing and of vision as *discriminate faculties* are by no means truly increased in such cases. What happens is simply that the resisting power of the nervous matter which forms the organ of special sense is *diminished* by the influence of the drug. He illustrates this by two cases. The one is that of a drunkard who died soon after from brain disease; it is worth little as evidence, but the other is satisfactory. A lad, aged 19, suffered from incontinence of urine, but otherwise was healthy. The dose of strychnia was gradually increased from $\frac{1}{24}$ to $\frac{1}{12}$ gr. The first dose, of the latter quantity, immediately produced impairment of sight, and *distressing sensibility of the eyes to the dazzling influence of light, and even flashes* after the eyes had been shut, or sometimes in a dark room. The strychnia was at once stopped and the symptoms quickly subsided (17, p. 214).

49. Objects appeared green in a case reported by Hemenway, where strychnia caused violent spasms, some lasting the unusual time of twenty minutes (21, p. 781).

Von Hippel has very lately added to the knowledge of the action of strychnia on the eyes of healthy persons. He injected it, in quantities varying from 2 to 3 milligrammes, in three persons in the right temple, in three in the left, and in one person in the arm. He found that the chromatic field for blue, but not for white, is increased.

The acuity of vision is transiently increased; the field of vision is more permanently augmented; the limits for the recognition of distinct points are moved out further towards the periphery. These changes only occur on the side where the injection has been made, and from this circumstance Von Hippel considers that the action is direct on the retina, and not through the central organs; but he admits the great difficulty of a correct conclusion (19, p. 32).

The results of Hippel have been confirmed by Cohn. Vulpian considers there is, as yet, no proof that strychnia acts locally on the retina, hence he doubts the utility or need of its hypodermic or endermic use in the neighbourhood of the lesion, for the action of the drug must be as easily and as quickly manifested by the medulla oblongata or by the ophthalmic ganglion when the strychnia is introduced in any other region of the body (24, p. 596).

50. *Hearing.*—Tinnitus aurium is an occasional occurrence. *Hyperæsthesia* is well marked in the following case recorded by Anstie. A woman, aged 33, suffering from a peculiar numbness with partial paralysis and wasting of forearm, derived much good from doses

of $\frac{1}{3}\frac{1}{2}$ gr. strychnia. This benefit induced her to urge an increase of the dose. It was raised to $\frac{1}{24}$ and then to $\frac{1}{16}$ gr., when marked symptoms appeared. The skin of the arms, of the palms of the hands, and of the soles of the feet became exquisitely tender to touch, so that she could hardly bear to walk, and a considerable tendency to reflex muscular contraction developed itself. The most distressing symptom was *the painful effect which any sound made upon the ear;* it was not that the sounds were heard at all more distinctly, but that the slightest sounds occupied the woman's whole hearing faculty, and a multiplication of impressions became positively painful. On returning to $\frac{1}{32}$ gr. dose these symptoms quickly subsided, and soon the cure was completed (17, p. 213).

Digestive Organs.

51. *Appetite*, according to Trousseau (p. 768) and Fouquier was increased when they gave this drug to paralytics, the bowels also becoming constipated. If the dose be increased or long-continued the appetite becomes impaired, the stomach disordered, and the bowels constipated. It is, however, considered doubtful if small doses do increase the appetite when the stomach is in a normal state (22, p. 667).

52. The flow of *saliva* is often much increased; it is one of the channels through which the drug is eliminated.

53. *Stomach, pains in.*—Bardsley (8), Fouquier (6), and others have noticed gastrodynia set up from the use of Nux Vomica and strychnia in various forms of paralysis, where the stomach functions were previously normal. Hahnemann makes this spasmodic pain in the stomach a marked feature in the pathogenesis.

Cases of poisoning occasionally present this symptom; in Obs. i there is acute pain with pulsations in the epigastric region, and the autopsy showed both stomach and duodenum to be congested, if not inflamed. In Obs. ii milk excites vomiting, there is redness of the gums and tongue, burning thirst, and pain in the stomach; to these are added next day vomiting, colic, and diarrhœa. In Obs. vi very severe pain in the bowels is recorded, and the post mortem revealed violent inflammation of the stomach. These symptoms may have been more marked owing to the presence of a large worm. In a case of paraplegia in a man of 34, when the endermic use of strychnia, from $\frac{1}{8}$th daily, increased by a quarter until $1\frac{1}{2}$ gr. were applied, the ordinary tetanic symptoms set in. He complained of violent burning in the stomach, with horrible feelings of anxiety and oppression (*Rust's Mag.*, xxxii). In a case of partial rheumatic paralysis of right arm, in a man otherwise healthy, burning heat in the stomach was frequently felt and necessitated the frequent suspension of the medicine (6, Case 9). Also burning pain in Case 11, (6). As far as cases of poisoning are evidence, pain and irritation of the stomach are not frequent symptoms.

54. *Vomiting*, far from being a common symptom, is a very rare one. Pereira (p. 1290) has fallen into the common mistake of supposing that its name is derived from its power to excite vomiting. Owing to the almost constant absence of this symptom it is more probable that

vomica is derived from *vomicus*, pestilential, on account of its pestilential qualities. The nut described by Serapion, and to which Pereira alludes, cannot have been either Nux Vomica or ignatia, for it is described as an emetic and purgative, to be given in two drachm doses.

At one time, when there were frequent opportunities of judging of the effects of small and moderate doses of Nux Vomica taken under the name of angustura bark, it was remarked that it never excited vomiting, diarrhœa, or inflammation of the stomach (Wibmer, 10, i, p. 189). Von Boeck says, "Vomiting occasionally attends strychnine poisoning. . . . . As regards the latter it is remarkable that in most cases of strychnine poisoning emetics fail to produce any effect; whereas sometimes, especially when strychnine has been introduced in substance, vomiting occurs spontaneously, which appears to arise from a direct action of strychnine on the mucous membrane of the stomach, upon which also small patches of inflammation are found" (21, p. 783). Copeland gives disordered stomach and constipation as effects of Nux Vomica, but vomiting rarely occurs (*Dict. of Med.*, iii, p. 374). It is present in Obs. ii, but does not appear until the second day, when gastritis was appearing. In Obs. ix it occurs at once after a teaspoonful of a mixture containing ʒij of the alcoholic extract to ℥ij of fluid. In another case, when a woman of 40, who took $\frac{1}{12}$th of a grain nit. strych. every hour for six times, was suddenly seized with giddiness and feeling as if she were forcibly bent backwards, and as if the hands were twisted behind her. This feeling soon passed, leaving pain in back and trembling of hands, vertigo, combined with nausea, and vomiting of a thin colourless fluid (*Frank's Mag.*).

55. *Liver.*—The physiological action on this organ is as yet little known, but its therapeutic efficacy in various hepatic affections has been well proved. Strychnia has been detected in the bile, and more abundantly in the liver than in any other organ. According to Röhrig and Vulpian the biliary secretion is much diminished in dogs during the tetanism. Schiff (1859) showed that in frogs during the convulsive stage an artificial diabetes occurred; this stage lasting sometimes in frogs from some days to a month renders them specially valuable for this experiment (24, p. 519). Coza found the same results.

55*a*. *Spleen.*—In dogs, where the cellular contractile fibres are numerous, the spleen is seen to contract vigorously during the tetanic attack, and to remain more or less so during the continuance of further spasms (24, p. 511).

56. *Intestines.*—Experiments on dogs show that the tetanising action affects the intestinal muscle. Nothnagel considers it has no effect in strengthening or accelerating the peristaltic action of the intestines (p. 667). One or more doses do not seem to affect the intestinal secretions, but a continued use of the drug, in Fouquier and Trousseau's experience, often produces constipation. Richter, who used strychnia endermically in paralysis, found constipation to be a constant symptom (10, p. 247). A characteristic action is the frequent and fruitless urging to stool. Its action on the mucous coat is undecided.

57. According to Hahnemann, who also gives constipation in the pathogenesis, the diarrhœa occasionally met with among its effects

consists either of very small evacuations, mostly composed of mucus, accompanied by fæcal motions and straining; or when there is copious thin fæcal evacuation, it is then the secondary action or result in a patient who had previously been constipated with fruitless urging to stool (241).

58. It excites *flatulence* and *flatulent colic*. It causes *fulness of the hæmorrhoidal vessels*, and this state is combined with frequent straining at stool and costiveness.

59. *Urine.*—It increases the flow of urine and the urgency to pass it, and according to Trousseau it is passed with more vigour (15, i, 768). Its action on the constituents of the urine has not been investigated.

Schiff (see p. 617) showed that in frogs, during the convulsive stage, an artificial diabetes occurred.

60. *Genital organs.*—It occasionally acts as an aphrodisiac on both sexes. In men it excites painful and constant erections. Trousseau noticed that it affects the muscles which erect the penis, so that erections occurred day and night, even troublesome in the case of those who previously had lost much of their virility (15, p. 772). In women it sets up uterine pains and increases the catamenia. Trousseau, Pereira, Hahnemann, and other observers testify to this aphrodisiac action.

Strychnia given to pregnant rabbits causes abortion (23, p. 600).

61. *Circulating organs.*—Experiments (Sigmund, Mayer, Richter, repeated by Vulpian) show that strychnia excites the vaso-motor centres and produces contraction of the arterioles with consequent considerable increase of blood pressure.

Vulpian, to prove that this elevation of blood pressure is not due to a direct irritation of the vaso-motor centre by strychnia, but to a reflex vaso-constrictive action, chloralises the animal before administering the poison. During the action of the chloral there is not the slightest augmentation of the intra-arterial blood pressure. The chloral, in sufficient doses, abolishes during its action reflex excitability which has the cerebro-spinal axis for its source, but leaves uninfluenced the direct excitability of medulla oblongata and spinal cord (24, p. 462).

In cold-blooded animals the pulse, during the tetanic paroxysm, is considerably retarded, amounting sometimes to temporary arrest in diastole. In rabbits, in dogs, in human beings, the cardiac pulsations are considerably accelerated and generally much enfeebled.

By some observers the tetanic condition has been considered as the result of the state of the vessels and increased blood pressure, but experiments, already alluded to, in frogs with excised hearts show the direct action of the drug on the spinal cord. Much, however, of the acceleration of pulse is probably due to the violent spasmodic movements and to the dyspnœa. As soon as these conditions cease the pulse returns to its normal state.

62. Anstie, from closely studying the effects of minute doses of strychnia, is convinced that there is something which is not understood and which is completely distinct from the familiar effects of this drug

in its action when given in very small quantities; some may be the taker's constitution, but he believes the general rule to be that doses which fall short of producing any poisonous effects increase the activity of the systemic circulation, diffuse a comfortable feeling of permanent warmth over the body (p. 152). This conclusion is drawn from therapeutic use; does it produce the same effect in those whose systemic circulation is normal? Unfortunately, the only results of experiments available are those of Hahnemann, but the disjointed manner in which these symptoms are reported deprive them, in some measure, of scientific value, besides the circumstance that some are derived from cases of dysentery and paralysis. In his earliest paper on the subject (*Hufeland's Journ.*, ii, part iii, 1796) he speaks of its causing febrile rigor; in his later work (the *Mat. Med.*) there are frequent entries of chills, febrile heat, and perspiration, but no evidence as to their connection, or if in a continued or intermittent form. During the tetanic condition there is a slight rise in temperature, which again falls towards the end of fatal cases, and during the paroxysm there are rigors and copious perspirations. The great rise in internal temperature observed in animals, and due to tetanic action, is discussed in paragraph 69.

63. *Heart.*—There is no noticeable cardiac disturbance, with the exception of the palpitation and quick irregular action during a tetanic attack. This is probably of a sympathetic character, and very dependent on the state of the respiration. In fatal cases the heart is the last organ to lose its vitality.

Post-mortem appearance.—The state of the heart formed the subject of discussion in the trial of Palmer for the poisoning of Cook with strychnine; the conditions are not constant, and therefore afford no characteristic sign. The heart usually partakes of the general muscular rigidity, and is found firm, hard, and empty of blood; sometimes it is flaccid and full of blood. In a few cases there is effusion into the pericardium. The blood is almost always in a fluid condition.

64. *Respiratory organs.*—Dyspnœa with anxiety is an early and marked symptom of the influence of this drug. The sense of stiffness of the muscles of the thorax may go on to complete tetanus of the inspiratory muscles. In some instances it excites spasm of the glottis, and to this cause are probably referable the screams which are sometimes heard. When the tetanising influences are great the respiration becomes more and more oppressed, with extreme anxiety, the face, at first pale, becomes red and then livid, projecting staring eyeballs and dilated pupils; the asphyxia may at last prove fatal, the respiration ceasing during the inspiratory movement. When the tetanic paroxysm ceases, the respiration returns and the signs of cyanosis cease. The dyspnœa may be partly due to the inability of the blood to absorb oxygen, as shown in Harley's experiments.

65. *Catarrhal condition.*—According to Hahnemann it excites catarrh in the whole track of the respiratory organs, the coryza being dry and the cough dry, and worse at night. In a case of old-standing hemiplegia consequent on ague, the patient after taking extract of Nux Vomica for a fortnight, the dose being gradually increased from 2 to 10 gr., was attacked with violent convulsive cough, with violent spasm

of the diaphragm ; it ceased on suspending the medicine, and the patient refused to resume it (6, Case 12).

66. *Skin eruptions.*—The cutaneous action is slight. Magendie says he has seen the affected side of paralytics treated by Nux Vomica covered with anomalous eruption, while the opposite was free (Pereira 9, p. 1297).

Harley relates the case of a young girl, who committed suicide by taking strychnia. At the post-mortem examination, the inside of the thighs and arms, also the side of the neck were of a scarlet colour, very like what is seen in scarlet fever ; the outside of the limbs was of the normal colour (*Lancet* i, 1856, p. 397).

In Obs. ix, after the paroxysm ceased, an eruption appeared over the whole body, but the kind is not stated. During and between the paroxysms there is profuse diaphorexia.

Itching.—After the spasmodic affections there often remains an intolerable and obstinate itching, affecting the body generally, but especially the scalp.

67. *Anæsthesia.*—This is a rare symptom. A lady suffering from chronic rheumatism took 60 drops of tr. Nux V. She remained well for two hours, then she became suddenly convulsed, and in a few minutes was quite tetanic. The lower jaw moved in a jerking way from one side to the other, but could not be opened. The upper and lower extremities were strongly flexed. The patient whined and groaned, but could not speak a word. Her skin was perfectly insensible, and she neither felt pinching nor pricking. These symptoms lasted a quarter of an hour and then went off.

During and immediately following the convulsions there is copious perspiration, principally of head and face.

68. *Muscular tissue.*—Nux Vomica has no special direct action on the living portion of muscular fibre except through the reflex stimulation. These stimulations occur more rapidly than in the normal state, and as between them there is no opportunity afforded the muscle to regain its normal extension, it retains throughout its contracted form, constituting tetanus. This tetanism also affects unstriated muscles in a minor degree, but the heart appears to resist its influence much longer than any other muscular part. This tetanism, in fatal cases, is followed by remarkable rigor mortis, and the occurrence of the latter immediately after death and its continuance for some days may be regarded as a characteristic sign of poisoning from this drug. Taylor recites the instance of a dog which he had destroyed with strychnia, retaining for a week rigidity so great that it was possible, by grasping the hind legs, to hold the animal out horizontally. The muscles affected with this rigidity become altered in consistence and of a deep brown colour.

As the result of long-continued tetanic action the muscle gives acid reactions in a greater degree than normal and yields more than the normal amount of substance soluble in alcohol. Some writers suppose that this increase, carried into the circulation, especially as similar chemical changes occur in the nervous centres and nerves, may contribute in some measure to the fatal issue. The equally rapid death

from strychnia of animals, first chloralised so as to prevent convulsions, militates against this view.

69. The prolonged, nearly continuous, and general spasmodic action established by this drug has a marked effect in increasing the internal temperature, even though the whole body is bathed in sweat. This rise, amounting sometimes in dogs to 5° Cent., corresponds with the very high temperature observed in idiopathic tetanus and convulsive epilepsy. This great increase of internal temperature seems confined to muscular action of a tetanic character, and is not observed in hysteric conditions. Bechard, in addition to Wunderlich's notice of J. R. Mayer, has shown by observations on men, "that the amount of heat developed is greater where the muscle effects a static contraction, *i.e.* not accompanied by useful mechanical work" (*Arch. gén. de Méd.*, 1861, i, p. 277).

That this increase of temperature is due to tetanic action is proved by its non-occurrence in animals, first curarised before the strychnia is introduced.

70. *Anatomical lesions.—In animals* killed by strychnia, used hypodermically or injected into the veins, there is found, according to Vulpian, a congestion, often very marked, of the whole extent of the gastro-intestinal mucous membrane; sometimes slight ecchymosis under this membrane, and occasionally bloody stools have been passed during the few hours between the cessation of the paroxysms and death. Generally there are sub-pleural, sub-endocardial, and sub-pericardial ecchymosis; apoplectic pulmonary spots, and infarctus of the spleen, marked congestion of the kidneys, of the nervous centres, and their membranes (24, p. 558).

Tardieu has never seen the slightest trace of sub-pleural ecchymosis, but only a very irregular, partial, and not marked congestion, owing to the fluidity of the blood. He quotes the experience of Cl. Bernard as testifying to the non-existence of the ordinary signs of asphyxia in animals killed by strychnia (20, p. 1076).

71. *In human beings* the state of the *lungs* has nothing very characteristic; sometimes they are healthy, at other times the seat of partial congestion, more generally quite choked with blood; in a few exceptional cases there is rupture of some of the superficial pulmonary vesicles (20, p. 1079).

Nunnely has made the same observation, and has also seen a coating of bloody mucus lining the trachea and bronchial tubes.

72. *Heart.*—Its post-mortem appearances are given at 63.

73. *Digestive organs* present no very characteristic appearances. In Obs. i there was discoloration of internal surface of stomach, doubtfully given as ecchymosis or inflammation. The duodenum is also described as inflamed, and the redness and injection of mucous coat extended down to middle of small intestines, which are there thickened and ulcerated, but the description is vague. In Obs. vi the stomach was violently inflamed and the inflammation extended to the middle of jejunum. In the very carefully conducted examination of Obs. xii the stomach and intestines were found normal.

Tardieu says the gastro-intestinal mucous membrane is often pale

and quite healthy; presenting, now and then, in a very few cases, violet-red patches, the presence of which is accounted for by the condition of the blood, and is wholly independent of inflammation. Sometimes there is a general redness, which indicates nothing more than interrupted digestion. The other abdominal viscera offer nothing abnormal (20, p. 1079).

Taylor states that there is not any appreciable change in the alimentary canal.

74. *Cerebro-spinal regions.*—Besides the habitual congestion of the *brain and its membranes*, there is sometimes a true effusion of blood either on the surface or in the substance of the brain; more often meningeal hæmorrhage between the pia mater and arachnoid. (See also notice of effusion into ventricle, § 75.)

75. When the *spinal cord* has been examined, it has sometimes shown no appreciable changes, at other times it has appeared covered with a bloody effusion, and its internal structure the seat of softening and complete disorganisation. Tardieu draws attention to a remarkable case, well reported by Blumhardt, where a kilogramme of thick, viscid, very dark blood flowed from the spinal cavity. The vessels which surround the spine were gorged; the spine itself was softened in its superior portions, and in some parts was reduced to pulp (20, p. 1077).

In Obs. xiii there was effusion in the spinal sheath, and the upper part of the cord was softened and the brain congested. In the fatal case, referred to in 46, the brain was very much congested; the ventricles contained more serum than normal, otherwise healthy; great serous effusion under the arachnoid covering of cord which was otherwise healthy. Tanquerel des Planches gives instances where there was serous effusion of the cerebro-spinal organs.

The reader is referred to Obs. xii, so accurately reported by Tarchini Bonfanti, as presenting a good example of the spinal changes produced by strychnia.

Very similar appearances were also seen in a case of cholera.

76. *Treatment of poisoning.*—The stomach to be cleared of its contents either by an emetic or the stomach-pump, but if tetanism exists the employment of the latter presents great difficulties. Gallard (11), whose experience Tardieu supports, advises at the same time the administration of a little Tr. iodine or tannin with the object of acting on any of the poison remaining in the stomach. For the tetanic stage a variety of remedies have been suggested, aconite, calabar bean, curare, cannabis, nicotine, morphia, hyoscyamine, but experience has shown that there is positive danger in the employment of these substances, and no evidence that in them or in any other substance is there presented a true antidote to the poisonous action of Nux Vomica and its alkaloids. Gallard and Nothnagel (22, p. 669), and Tardieu (23, p. 1075), think more favourably of chloroform and chloral. Chloral modifies the strychnia symptoms to a great extent, that is, it diminishes and to a great degree prevents the injury arising from the violent tetanic paroxysms, and the earlier it is given after the strychnia the greater is the antagonistic effect, but the very large doses to gain this end are in themselves a source of great danger. The experiments of

Liebreich and Schroff show that animals poisoned by fatal doses of strychnia can be recovered by the immediate introduction of chloral. On the other hand, the experiments of Vulpian show that the immediate injection of chloral hydrate, in the direction of the heart, into the veins of a dog, just as convulsions from strychnia are setting in, exercises a powerful effect on the tetanism and remarkably reduces the internal temperature. This benumbed condition continues for two or three hours, and when it ceases may be kept up by further injection of chloral. One dog may recover, but others die from the after-effects of the strychnia and chloral involving both cerebrum and spinal cord (24, p. 560). Such experiments cannot be hazarded in the human being; the employment of the inhalation of anæsthetics, such as chloroform and ether, ought to be limited to the degree which reduces the highly irritable condition of the reflex centres so as to modify the tetanic action which threatens suffocation.

Artificial respiration, the respiration of oxygen, from their apparent utility in the lower animals, have been recommended as means, but there is no record of their employment in human beings. The application of the galvanic current along the spine has been suggested. Ranke found that it suppressed tetanic attacks set up in animals by strychnia.

Bibliography.

The list of early writers will be found in Murray's work, No. 1, in Wibmer's work, No. 10, and in Bayle No. 7. The unnumbered works at the end of this list are such as the writer has not consulted.

1. Murray, J. A., *Apparatus Medicaminum, tam simplicium quam compositorum*, Gottingæ, 1787—91.
2. Hahnemann, S., *Essay on a New Principle for Ascertaining the Curative Power of Drugs*, 1796; *Hufeland's Jour. der pratischen Arzneikunde*, ii, part iii; Translation of his Lesser Writings by R. E. Dudgeon, M.D., Lond., 1857.
3. Hahnemann, S., *Fragmenta de viribus medicamentorum positivis, sive in sano corpore humano observatis*, Leipsic, 1805.
4. Hahnemann, S., *Reine Arzneimittellehre*, vol. i, Dresden and Leipsic, 1830. The references made are to the Translation by Dr. Dudgeon, Hahnemann Publ. Soc., Lond., 1880.
5. Magendie and Raffenau-Delile, *Examen de l'action de quelques végetaux sur la Mœlle Epinière*, Paris, presented to the French Academy of Sciences, 1809.
6. Fouquier, Prof. F., *Mémoire sur l'usage de la noix vomique dans le traitement de la paralysie; Bul. de la Soc. de la Faculté de Méd. de Paris*, v, p. 219, 271, 352, 1811.
7. Bayle, A. L. J., *Bibliothèque de Thérapeutique*, tome iii, p. 128—248, Paris, 1830.
8. Bardsley, J. L., *Hospital Facts and Observations Illustrative of the Efficacy of the New Remedies, Strychnia, Brucine, &c.*, Lond., 1830.
9. Pereira, Jonathan, *Materia Medica*, vol. ii, 2nd edit., Lond., 1842.

9a. Brown-Séquard, *Comptes rendus*, 1849.

10. Wibmer, Karl, *Die Wirkung der Arzneimittel und Gifte*, Bd. v, München, 1842.
11. Gallard, "Empoisonnement par la strychnine," *Bul. de l'Acad. de Méd.*, 17th Sept., and 7th Oct., 1862, and *Ann. d'hygiène et de méd. legale*, 1865, t. xxxiii, p. 368.
12. Harley, G., The *Lancet*, June 7th and 14th, and July 12th, 1856.

13. CHRISTISON, Prof. R., *Treatise on Poisons*, Edin., 1845.
14. TAYLOR, —, *On Poisons*, London, 1848.
15. TROUSSEAU et PIDOUX, *Traité de Thérap. et de mat. méd.*, Paris, tome i, p. 768, 1858.
16. SPENCE, A. J., "On the Mode of Strychnine Action," *Edin. Med. Journ.*, July, 1856, p. 44, 1856.
17. ANSTIE, F. E., *Stimulants and Narcotics*, Lond., 1864.
18. GRAY, J. ST. CLAIR, *Strychnine, its Source, Physiological Action, &c.*, Glasgow, 1872.
19. HIPPEL, A. VON, *Ueber die Wirkung des Strychnin auf das normale and kranke Auge*, Berlin, 1873.
20. TARDIEU, AMBROSE, *Étude sur l'empoisonnement*, 2nd edit., Paris, 1875.
21. VON BOECK, *Ziemssen's Cyclop. Pract. Med.*, vol. xvii, 775, 1878. He gives the following principal German authorities: STANNIUS, *Mueller's Archiv f. Physiolog.*, p. 222, ff. 1837; KOELLIKER, *Archiv f. path. Anat. v. Virchow*, x, 1, 1856; PELIKAN, *Beiträge zur gerichtl. Medicin*, Wurtzburg, 1858; MAYER, Prof. H., *Ueber die Natur des durch Strychnin erzeugten Tetanus*; *Henle und Pfeufer's Zeitschrift für rationelle Medicin*, vol. v, p. 257; MAYER, S., *Wiener Akad. Sitzungsber., Math. physic. Classe*, 3 Abth., 1871.
22. NOTHNAGEL, H., and ROSSBACH, *Mat. Méd. et Thérapeutique*. Translated from the 3rd German edition by J. ALQUIER, Paris, 1880.
23. RINGER, SYDNEY, *Handbook of Therapeutics*, 9th edit., Lond., 1882.
24. VULPIAN, A., *Leçons sur l'action physiologique des substances toxiques et médicamenteuses*, Paris, 1882. The following papers or treatises are alluded to by VULPIAN, "Action comparée de la strychnine et du curare," par MARTIN-MAGRON et BUISSON (*Journ. de Brown-Séquard*, t. ii, 473, iii, iv). VULPIAN alludes to this as "travail remarquable." "Experiments with Nux Vomica on Frogs," A. MOREAU, *Comptes rendus de la Soc. Biologie*, 1865, p. 173. CH. RICHET, "De l'action de la strychnine à tres forte dose sur les Mammiféres" (*Compt. rendu de l'Acad. des Sciences*, 12 juillet, 1880, t. xli, p. 131). E. HECKEL, "Action de la strychnine sur les mollusques gastéropodes (*Rev. scientifique*, 12 juillet, 1879, p. 38); LUCIEN WINTZENRIED, *Recherches expérimentales relatives à l'action physiologique de la Brucine*, Genève, 1882.
25. CL. BERNARD, *Leçons sur les effets des substances toxiques et medicamenteuses*, Paris, 1858.

CASES OF POISONING WITH NUX VOMICA AND STRYCHNIA.

Obs. I. *Death from a considerable quantity of Nux Vomica, reported by Jules Cloquet.*

Pierre Duste, aged 45, of a bilious temperament, of a vigorous constitution, resolved in a fit of jealousy to poison himself. With this intention he took, on the 13th June, 1820, a considerable quantity of Nux Vomica, which he dusted over his food. Almost immediately after swallowing this he was attacked with violent convulsions. A medical man who was called excited vomiting by giving hot water and milk; the patient was then carried to the hospital of Saint Louis, where he arrived about six in the evening. His features were very much altered; he experienced a general depression; convulsive paroxysms closely followed one another; they were marked by vigorous rigidity of all the muscles, the trunk and the extremities in a state of violent extension, the jaws strongly closed. The patient, in a state of singular agitation, uttered interrupted cries and implored assistance. The pulse remained

normal. An emetic excited copious vomiting, an enema was also administered. During the night the senses of sight and hearing acquire an excessive sensibility; such is the irritability of the muscles that touching the patient is sufficient to excite convulsive movement; even a slight noise produces the same effect. During the convulsions the pulse is quick and agitated, and the body is bathed in perspiration. 14th (7 a.m.).—The patient is calmer, the convulsions are shorter, less violent and less frequent, but are still liable to be excited by the causes previously mentioned. The pulse is normal, sensation of lassitude and of being bruised throughout the whole body, no pain in abdomen (a weak opiate draught was given). 9 a.m.—The convulsions have ceased, and hopes are now entertained of his recovery. He continued in his calm state during the day and the night, complaining, however, of weakness and general pains. In the evening of the 15th the pain is concentrated in the epigastric region, the skin is dry, and the pulse frequent. 16th (6 a.m.).—Pulse small, almost imperceptible, dryness and heat of skin, redness of the margins of the tongue, acute pain in the epigastric region, pulsations in this region, feebleness, extreme prostration, alteration of features, eyes staring, intellectual faculties entire. Death at 10 a.m.

Examination forty-eight hours after death.—About four ounces of serum in the lateral ventricles of brain, no appreciable alteration in meninges or cerebrum, considerable serous effusion under arachnoid membrane of the spine. The liver large. The stomach contains some tablespoonfuls of a muco-sanguineous brownish liquid, the internal surface presents at various points a discoloration varying from red to a deep black; it is impossible to say whether this is owing to ecchymosis or to inflammatory action. The duodenum is filled with yellowish mucous fluid and is inflamed; the redness and injection of the mucous membrane extends, gradually decreasing, to the small intestine; the middle portion of this is contracted and thickened, the mucous membrane at the contracted portions being ulcerated. Bladder is small, contracted, empty, and slightly inflamed, containing about a spoonful of a puriform liquid. Congestion of lungs, especially towards their base, which is reddish. Heart normal. Considerable rigidity of muscles (although immediately after death they were quite pliant), ecchymosis of skin, especially at the dependent parts of the body. (Communicated by M. Jules Cloquet, Orfila, *Traité de Toxicol.*, tom. ii, p. 466.)

Tardieu, commenting on this case, says: "Les termes, malheureusement trop vagues, de cette description anatomique, se ressentent de l'époque à laquelle cette observation, qui date de 1820, a été recueillie "(20, p. 1184).

Obs. II. *Convulsive Symptoms and Gastric Irritation from a drachm of Nux Vomica. Recovery.*

A young woman swallowed purposely a drachm of Nux Vomica mixed in a glass of wine. In fifteen minutes she was seized with pain and

heat in stomach, burning in gullet, a sense of rending and weariness in limbs, succeeded by stiffness in joints, convulsive tremors, tottering in her gait, and at length violent and frequent fits of tetanus. Milk given after the tetanus began excited vomiting. She was further affected with redness of gums, inflammation of tongue, burning thirst, and pain in stomach. The pulse also became quick and the skin hot. Next day, though the fits had ceased, the muscles were very painful, especially on motion. Tongue and palate were inflamed, and there was thirst, pain in stomach, vomiting, colic, and diarrhœa. These symptoms, however, abated, and on the fourth day disappeared, leaving her exceedingly weak (Christison on *Poisons*, p. 900, taken from Tacheron, *Lond. Med. Repository*, xix, 456).

Obs. III. *Overdose of Nux Vomica, reported by Rademacher, referred to by Hahnemann.*

"I had prescribed to an irritable man the ext. of Nux V. on account of spasms of the bowels. He took by mistake eight grains. In a short time after he could not stand, but was obliged to sit upon a chair. His mouth was convulsively drawn back, the under jaw closed upon the upper, so that he could not open his mouth. After it had passed off he said he had not lost consciousness but had an intolerable itching of the nose. He felt as if millions of ants ran about his face. He saw objects in a much clearer light than ordinary. He suffered no pain" (*Hufeland's Journ.*, iv).

Obs. IV. *Poisoning from large dose of Nux Vomica.*

A. D—, aged 20, a healthy labourer, was admitted into the Royal Free Hospital, having three quarters of an hour previously taken about a drachm and a half of powdered Nux Vomica. When admitted he was in profuse perspiration, the skin of the face, neck, and chest was greatly congested, the eyes suffused, the pupils slightly contracted, the pulse hard and excited. The patient was greatly agitated, and on moving he grasped firmly the nearest object for fear of falling.

A few minutes after admission a tetanic paroxysm came on suddenly, the man was thrown into a state of opisthotonos, all his muscles becoming rigid and respiration for the time suspended. This fit lasted about half a minute, when the muscles became relaxed and he was again able to answer questions. He states he swallowed nearly all the powder of Nux Vomica. Soon after he felt a little drowsy, and the first paroxysm of tetanic spasm came on about ten minutes afterwards. He had several of these fits before he was brought to the hospital, and five after his admission into the ward. They went on decreasing in severity, and none were observed after the fifth was over. The night following the patient slept well, and the next day he complained of cramping pains in the limbs when he moved them; tongue dry, much thirst, bowels confined. Next day patient was dismissed well. Stomach-pump used (*Lancet*, 1853, ii, p. 385).

Obs. V. *Poisoning by Nux Vomica contained in a Vermin Killer.*

A. C—, aged 16, half an hour before admission into the Liverpool Hospital had swallowed some of Gibson's Vermin Killer. When admitted she was much excited and hysterical, and complained that her back felt stiff and her throat hot. An emetic of sulp. zin. was administered, causing her to vomit. About ten minutes after admission twitching of the muscles, which was aggravated by touching the patient, even when she did not know she had been touched, commenced in the limbs and back and rapidly extended over the body, increasing in violence and rapidity, until about twenty minutes after admission the whole body was violently convulsed, the back being slightly arched, the jaws firmly clenched, and the face livid, apparently from interference with the respiration in consequence of spasm of the muscles of the chest. The respirations were very slow and laboured, ceasing entirely when the patient was moved or touched. Pulse quick and strong. A hypodermic injection of solution of hydrate of chloral (℥j to ℥j). When half an ounce had been injected the spasm of the muscles of chest and jaws relaxed, the patient being able to breathe freely and speak, the face resuming its natural colour; gradually other symptoms disappeared. Next morning she seemed well (*Lancet*, 1873, i, p. 698).

Obs. VI. *History of a Poisoning with Powder of Nux Vomica, along with the Appearance on Dissection, by C. Consbruch, of Bielfeld.* (*Hufeland's Jour., vol. v, p.* 42.)

A somewhat stout maidservant, who had always been in good health, took the desperate resolution, on account of some disagreeable circumstances she had encountered, to deprive herself of life. She asked an apothecary for threepence worth of rat poison (rattenkraut) —by which arsenic is here understood—instead of which the apothecary gave her about two drachms of grated Nux Vomica. About ten o'clock in the morning of the 10th of May, 1796, she took the whole of this quantity in a little water. In half an hour she complained of severe pains in the bowels which increased every moment, and soon reached an indescribable degree of severity. I was called to see her about noon and found her in bed suffering the most dreadful convulsions, especially opisthotonos, which abated and returned several times in a minute. The face was strongly suffused with blood, scarlet, the eyes fixed and glistening, the hands cold, the pulse almost gone. All this time she was perfectly conscious and told me she had taken three pennyworth of rat poison, upon which she soon felt pain in the bowels and then an indescribable anxiety, which still continued. She had drunk a quantity of lukewarm milk without the smallest relief. Under the certain belief that she had taken arsenic, in addition to the ordinary external applications I made her take a solution of the liver of sulphur, gave her a clyster, and opened a vein. But all in vain!

The pains went off, a cold sweat broke out, and she died a little after twelve o'clock at night.

An examination of the body took place the following day in the presence of several witnesses. Externally the whole right side was purple, the abdomen dreadfully distended, the hands convulsively clenched, the head pale and collapsed, the mouth shut, the lips blue with traces of blood having run out by them, the nails natural and firm, but the hair was easily pulled out. In the abdomen the liver, spleen, kidneys and womb were perfectly sound. The intestines strongly distended with air. The stomach violently inflamed and in the neighbourhood of the pylorus almost mortified (brändig). The inflammation extended to the middle of the jejunum. The ileum was quite healthy. In the stomach a large worm (spulwurm) was found eaten through into three different portions, and about six ounces of pulpy matter, which I carefully collected into an iron pot for examination. The head and chest were not opened. The examination of this pulp revealed the presence of a quantity of grated Nux Vomica, but no trace of arsenic.

Obs. VII. *Poisoning from four drachms of Nux Vomica. Death.*

A young woman swallowed between three and four drachms of this substance in powder, and in half an hour was seen by Mr. Ollier. She was sitting by the fire, quite collected and tranquil; her pulse about 80 and regular. He left her for about ten minutes to procure an emetic, and on his return found that she had thrown herself back in her chair, and that her legs were extended and considerably separated. She was perfectly sensible and without pain, but seemed in alarm, laid hold of her husband's coat, and entreated him not to leave her. A perspiration had broken out on her skin, her pulse had become faint and much quicker, and she called frequently for drink. She then had a slight and transient convulsion. Recovering from it, she was in great trepidation, kept fast hold of her husband, and refused to let him go, even for the alleged purpose of getting her drink. In a few minutes after she had another and a more violent attack, and shortly afterwards a third; the duration of these was from a minute and a half to two minutes. In them she retained her grasp; her whole body was straightened and stiffened, the legs pushed out and forced apart. I could not (says Mr. Ollier) perceive either pulse or respiration; the face and hands were livid, the muscles of the former, especially of the lips, violently agitated, and she made constantly a moaning, chattering noise. She was not unlike one in an epileptic fit, but did not struggle, though, as she was forced out, it was difficult to keep her from falling on the floor. In the short interval of these attacks she was quite sensible, was tormented with incessant thirst, perspired, had a very quick and faint pulse, complained of being sick, and made many attempts to vomit (I should state she had swallowed some ipecacuanha powder to evacuate the poison). She continued to refuse to let her husband move, and to the question whether she was in pain, replied "No, no, no!"

A fourth and most vehement attack soon followed, in which the whole body was extended to the utmost, and she was rigidly stiff from head to foot, insomuch that, with all the force of the surgeon, he could not bend her thighs on the pelvis to replace her on her seat. From this she never recovered; she fell into a state of asphyxia, and never breathed again. She now relaxed her grasp; her discoloured hands dropped upon her knees; her face, too, was livid; the brows contracted; the lips wide apart, showing the whole of the closed teeth, and a salivary foam issued plentifully from the corners of her mouth. The expression of the whole countenance was at this time very frightful. On removal of the body, it was discovered that the urine had been discharged. She died in about an hour after taking the poison. Five hours afterwards, she was still as straight and stiff as a statue; if you lifted one of her hands, the whole body moved with it, but the face had become pale in comparison, and its expression more placid (*Lond. Med. Repos.*, xix, p. 448).

Obs. VIII.

A man named Ram Serdek was carrying an umbrella for Lieut. Hailes, when he suddenly fell down in a fit; he appeared stiff and lifeless, and when raised up stood upon his heels, with the feet and toes turned upwards. The eyes remained open but fixed, and the jaws were so firmly closed that it was some time before they could be separated in order to administer ammonia. He recovered in the course of a few minutes and soon after vomited.

On inquiry into the cause of the fit, he said it was owing to his having taken *Kuchila*, Nux Vomica, that morning without having eaten anything before, except a little milk. Two hours after taking the dose he had the fit. He had been taking it regularly for four months on account of a skin affection.

He began with $\frac{1}{8}$th of a nut, the usual dose at first with the natives, taken morning and evening immediately after eating; the quantity was gradually increased; and for the last month he had taken a whole nut, morning and evening, the maximum dose, which they never exceed. A nut weighs about 20 grains (*Trans. Calcutta Med. and Phy. Soc.*, i, 138, by T. E. Baker, 1823).

Obs. IX.

The patient was a lady, aged 50, affected with some abdominal complaint. The dose she took, by mistake, was a teaspoonful of a mixture containing ʒij of the spirituous extract of Nux Vomica in ℥ij of fluid. She had scarcely swallowed the medicine when she was attached with rigor and vomiting, rapidly followed by a convulsive attack; for the remainder of case see Symp. 18 under Motility in general arrangement of pathogenesis.

Obs. X. *Poisoning from* $\frac{1}{24}$*th gr. Strychnine. Recovery.*

A married lady in good health took one pill, made from a recipe directing half a grain to be divided into twelve pills. After taking the pill she went to bed, slept for an hour, then awoke screaming out, "I am poisoned," started up in bed, fell back, beat the bedclothes violently with her arms, became convulsed all over, then stiff, her eyes staring in her head, and her features contorted.

Such was the statement made to me on my arrival, which was within twenty minutes of the seizure. While I was looking at the recipe, another attack came on; she sprang up in bed with a wildly frightened aspect, uttered a shriek, and became convulsed (*Lancet*, 1856, ii, 695). The remainder of the case is given under Sympt. 18*a* in general arrangement of pathogenesis.

Obs. XI.—*Exts. from Vekoskrift för Läkare, ii, p.* 169. *Intoxication.*

"Someone took 20 grains of Nux Vomica; after half an hour he appeared as if intoxicated, the limbs stiff, tense, in consequence of which his walk was staggering, as if he must fall; soon after eating, these symptoms disappeared without vomiting or action of the bowels" (Quoted by Wibmer, *Wirk. der Arzneimittel und Gifte*, 5 Bd., 221, given also in Murray, *Apparatus Medicaminum*, vol. i, p. 709).

Symp. 374 of Hahnemann's pathogenesis, "Continued stomach-ache," from the above source, is a record that "a woman, after a dose of Nux Vomica, suffered a long time from convulsions and cardialgia."

Obs. XII. *Poisoning by Strychnia, followed by death. Reported by Dr. A. Tarchini-Bonfanti, Professor of Medical Jurisprudence*, 1856.

G. S—, who until lately had always enjoyed good health, came, on the 26th of August, 1855, from Lodi to Milan, where he went to an inn where he was well known, insisting on being left alone in his room by his fellow-traveller, who yielded to his request. Towards noon he came downstairs, spoke to the innkeeper and the servants, who saw nothing unusual in him, and went out. Shortly afterwards he was seen to stagger in the streets, and was taken in a carriage to the pharmacy of S. G. Moro. He was visited there by Drs. Emilio Casanova and Cavalleri, both municipal doctors, and by S. Gonzales, surgeon. His symptoms were as follows:

G. S—, seated and perspiring, called out in a strong, natural voice, that he was seized with the cholera then prevalent in Milan. He complained of a creeping, as of ants, in his legs and arms, of a feeling of spasm in his throat and stomach, accompanied by vain attempts to vomit. No choleraic physiognomy. Dr. Casanova tried to calm his fears, and prescribed two ounces of peppermint water with a scruple of

anodyne liquor and one of laudanum, which the patient took by degrees. Flatulence ensued, and the spasm of the stomach appeared to subside. Then he rose of his own accord and lay down on the bed; but his cries and fear of cholera did not cease, notwithstanding the assurances of all the doctors who came to see him. The above symptoms, whilst increasing, were accompanied by spasmodic contractions and opisthotonos; the formication in the extremities changed into cramp; the spasm of the stomach reappeared alternately with that of the throat, and was complicated by painful jerks as if from electric shocks every time the extremities or any part of the body was touched. Dr. Casanova thought there was an acute affection of the spine, and bled him, with the approval of the other physicians. The blood gushed out as if from an artery, and coagulated in the usual manner, without any special appearance of the serum, either in quantity or quality. Towards four o'clock, G. S— seems quieter, the spasmodic contractions appear at longer intervals, but the general jerkings increase in violence; the slightest touch provokes them.

The patient still insisted on his fears of cholera, and desired to be taken to the hospital. As much to humour him as to rid the Moro family of such an inconvenient guest, his request was granted, and he was taken there about seven o'clock. But on the way from the surgery to the hospital the patient died.

The post-mortem examination required by law was made by Drs. Antonio Tarchini-Bonfanti and G. Martinelli about twenty-four hours after death.

Exterior appearance.—G. S—, apparently about forty-five years of age, was tall, well made, and finely proportioned, robust and embonpoint. The face of the corpse is calm, the pupil moderately dilated, the mouth closed but not contracted. The neck is a little large; the chest ample, dilated, and very sonorous, the abdomen slightly swollen; the upper extremities are very flexible, the lower extremities rather rigid, the fingers clenched, but not quite closed. The corpse lies on its back; the front of the body is pale, but the posterior is entirely of a violet colour, as if cyanic; this colour is also seen in the fingers, and is strongly marked in the scrotum. The cadaveric odour is slight. No trace of lesion exists on the exterior.

Head.—Infiltrated blood in posterior portion of scalp; skull of normal thickness. The dura mater, of a white pearly colour, adheres strongly to the level of the sinus, which contains a little darkish blood, rather fluid than thick. The arachnoid and pia mater are thin and transparent, showing a very few bluish vascular ramifications. The grey substance of brain is pale and a little dense, the medullary portion is milk-white and firm. The plexus choroideus is of a rose colour. The pineal gland is ash coloured and soft. The venous sinuses at the base of the brain retain a small quantity of thick blood. The cerebellum is in the same condition as the brain.

Spine.—On opening the vertebral canal there is an abundant sanguineous effusion, and here and there circumscribed collections of black blood. The dura mater lining the canal is red, dull, giving the appearance as if the whole cord were made of red wax; the arachnoid

is transparent; the pia mater strongly injected; the substance of the cord normal.

Neck.—Some of the cervical glands are of the size of a large nut (aveline); the thyroid gland is a little larger than normal, reddish, but healthy in its texture.

Chest.—The mucous membrane of larynx, trachea, and bronchi is rose coloured, covered with a little mucus; the bronchial ganglions are blackish and a little swollen. The lungs are pressed back from the sternum to the extent of three fingers' breadth; they are ashy, with large black spots, light, feebly crepitant, and congested with blood. No serous effusion either in pleura or pericardium.

Heart is flaccid and so softened that it is most easily torn; it is filled with red blood. Its volume is larger than the fist of the corpse. On the anterior and external surface of the heart there is a strong and resistant cartilaginous patch. Its various cavities contain a small quantity of dark, thick, viscid, coagulated blood; valves normal. The arteries and veins contain a certain amount of blackish pitchy blood.

Abdomen.—No serous effusion. The liver of moderate size, dull red, dense, granulous, presents an engorgement of blackish, thick blood in the principal branch of the portal vein. Gall-bladder is full of viscid, greenish bile. The spleen is small, pale red; the pancreas is pale and hard, enveloped in a thick coating of fat; the kidneys are of a dull red colour and the tissue very dense.

The mucous membrane of mouth, of pharynx, of œsophagus, is rose coloured and normal, that of the stomach is pale rose colour without any partial injection, and covered with whitish mucus; the cardiac and pyloric orifices normal. The intestines are rather pale and distended with gas, otherwise normal (20, p. 1167).

Obs. XIII. *Poisoning from forty grains of Strychnia.*

A young man, aged 17, swallowed 40 grains of strychnia. The symptoms came on in about a quarter of an hour; trismus and spasmodic contraction of all the muscles speedily set in, the whole body becoming as stiff as a board; the lower extremities were extended and stiff, and the soles of the feet concave. The skin became livid, the eyeballs prominent, and the pupils dilated and insensible; the patient lay for a few minutes without consciousness and in a state of universal tetanus. A remission occurred, but the symptoms became aggravated and the patient died asphyxiated, from the spasm of the chest, in about an hour and a half after taking the poison. Appearances on inspection twenty hours after death:—The body was very rigid. There was effusion in the spinal sheath, and the upper part of the spinal marrow was softened. The brain was congested, but the alimentary canal was in its normal state (*Lancet*, January 7th, 1838).

PATHOGENESIS WITH COMMENTARY.

The symptoms to which no reference is attached are drawn from Hahnemann's *Schema** (4), § refers to the paragraphs, and Obs. to the cases of poisoning in this monograph. The letter *H*, when introduced, indicates that the symptom is given by Hahnemann in addition to the paragraph. Symptoms within parentheses mark the symptom as doubtful; this doubt is greater when a point of interrogation is added.

Nervous System.

Sensibility.

1. Great sensitiveness to external impressions, especially of the organs of touch, hearing, and vision.—§ 23, Obs. i.
2. Increased irritability of nervous system shown in restlessness, anxiety, trepidation, trembling, emotional sensibility.
3. Greatly increased reflex sensibility.—§ 25, 35.
4. Sensations of stiffness and tightness:—or slight pain and sense of stiffness:—or weight and weakness affecting many muscles, leading to tetanism.—§ 30.
5. Formication; intolerable itching over all the body, principally scalp.—*H*, § 32, Obs. iii. Creeping as of ants over legs and arms, with spasms in throat and stomach.—Obs. xii.
6. Sensation of heat or glow in the skin, especially down the spine. —§ 44.
7. Stitch-like twitchings in various parts, so that the whole body is shaken by them, darting through the whole body:—twitching and quivering under the skin. General sense of weariness and weight in the limbs; sensations of sudden powerlessness and weariness.
8. Pains relieved by lying down.
9. Sensations of burning inward heat through the whole body.

Commentary.

Nux Vomica ought to be useful in prurigo, in which indeed ignatia has actually proved curative.

* This consists of 1301 symptoms, of which 1200 are warranted by Hahnemann himself, 48 are taken from authors, and the remainder are contributed by three other observers (F. Hahnemann, Flaeming, and Wahle). All, save perhaps those of the last named, were probably the effects of appreciable doses on the healthy subject.—Ed.

Motility.

10. Increased irritability, shown in restlessness, jerkings, twitchings, trembling, anxiety.—§ 23.
11. Sensations of stiffness, of slight pain and of stiffness, of weight and of weakness; these may affect many muscles, and if the dose be continued, lead to tetanism.—§ 30.
12. Electric-like shocks, shivering and convulsive shaking prior to paroxysm; painful jerks, like electric shocks, every time any part of the body is touched.—Obs. xii. Electric-like shocks compel her to rise and walk about.—Obs. ix.
13. The least touch, a deep breath, a cough, the slightest noise or movement, excites tetanic paroxysms.—§ 24, 35, Obs. i, xii. Twitching of muscles excited by touch unknown to patient.—Obs. v.
14. Patient prepared for touch sometimes suffers no resulting paroxysm. —§ 35.
15. These twitchings, commencing in limbs and back, rapidly extend over the whole body, which becomes violently convulsed, the back arched, the jaws firmly clenched, the face livid, respiration slow and laboured, ceasing entirely when patient was moved or touched.—Obs. v.
16. She had thrown herself back in the chair, her legs extended and considerably separated. Perfectly sensible and without pain, but in great alarm laid hold of her husband's coat entreating him not to leave her. Perspiration, pulse quick and weak, frequent calls for water, then a slight and transient convulsion. On recovery from this felt great trepidation, refused to let him go; in a few minutes another and more violent attack, and soon a third; these lasted from one to two minutes, in them retained her grasp, the whole body straightened and stiff, legs pushed out and separate, face and hands livid, muscles of former violently agitated, moaning chattering noise; sensible during attacks, tormented by thirst, great perspiration. In fourth paroxysm rigidity of muscles so great that surgeon could not flex thigh on pelvis in order to place her on a chair. Death from suffocation followed this attack.—Obs. vii.
17. Suddenly fell down appearing stiff and lifeless; when raised stood upon his heels with the feet and toes turned upwards, eyes open but fixed, trismus; lasted a few minutes and then vomited.—Obs. viii.
18. Almost immediately after swallowing the medicine she was attacked with rigor and vomiting; got worse every minute. Her face, previously pale, became of a very red colour, her cheeks were burning hot; eyes were fixed, or were often turned so much up into the head that the contracted pupil could not be seen; the features were distorted, mouth fast closed, grinding of teeth; rapid, grunting, interrupted respiration; great anxiety, violent palpitation, and involuntary loud crying out. When she screamed out her head was drawn backwards, whereupon mouth was opened wide and gave her countenance a horrible expression; tongue was then protruded, and was several times severely wounded by jaws closing suddenly upon it. She had a great dislike to fluids, which she was sometimes utterly

unable to swallow. She trembled all over, and could only keep seated for a few minutes at a time. She was then compelled, as by an electric shock, to rise up and to totter about the room. Speech was continually interrupted by hiccough ; it was weak, monosyllabic, and often quite unintelligible, her wishes could only be guessed at by her signs. Pulse small, hard, and quick. The symptoms lasted in all about three hours. They were followed by great exhaustion, and an eruption (kind not stated) over the whole body.—Obs. ix.

18*a*. She started up in bed with a wildly frightened aspect, uttered a suppressed shriek, fell back in bed, the left side being convulsed, beat the bedclothes with her arms, was oppressed for want of breath, not gasping, but could not breathe owing to violent contraction of the muscles of the chest ; eyes prominent, pupils dilated, with a glaring, staring, wildly anxious gaze ; features contorted, mouth drawn to one side, convulsions spasmodic, agitated twitchings assuming a tetanic form ; she became quite stiff. In about ten minutes she came out of the attack, remained so for a few minutes, and then had a second and a third, each less violent than the other. Quite well during the intervals ; her intellect quite clear all the time. In an hour and a half from first seizure she was well and remained so.—Obs. x.

19. Tetanic attacks shown in trismus, opisthotonos, more rarely emprosthotonos, and still more rarely pleurotonos.—§ 35.

20. Intelligence never lost during the attacks, but great anxiety and various phases of emotional sensibility.—§ 23.

21. Attacks sometimes prececed by confusion of sight, sparks before eyes, tinnitus aurium, vertigo, unsteadiness in walking, then a sense of tightness, stiffness in muscles, especially of trunk, throat, and jaw ; also trembling, electric-like shocks, formication, and shivering ; then follow tetanic attacks, attended by painful anxiety, fright, palpitation of heart, and sweating.—§ 24.

22. After attacks there remains sense of muscular weakness and stiffness, bruised feeling, sometimes accompanied by involuntary twitchings.—§ 37.

23. Remarkable rigidity, muscles felt like boards.—Obs. vii, § 68.

24. Trembling sensation through the whole body.

Commentary.

The marked resemblance of the tetanism of Nux Vomica to idiopathic and traumatic tetanus strongly suggests it as a remedy in these rare and too often fatal diseases. The only record of its use is that given by Stillé, who cites eight cases of the traumatic form recovering under the use of the ordinary fractional doses of strychnia ; and Dr. Raymond's case, in which tetanic symptoms supervening on some surgical interference in the genito-urinary region yielded to Nux Vomica 1 (*Bull. de la Soc. Méd. Hom. de France*, ii, 139).

A better knowledge of the causes of paralysis has restricted the former indiscriminate use of this drug, but not a few recoveries are independent of the remedy. Where useful its action can only be explained on antipathic lines, except in the few cases where abnormal

reflex action is present (vide § 28). Vulpian, one of the latest and best writers on strychnia, is sceptical as to its utility on practical and theoretical grounds (24, p. 585). Nothnagel expresses much the same opinion, and considers that where strychnia is indicated electricity offers a better and a safer remedy. He thinks the virtues assigned to it by Brown-Séquard in "reflex paralysis" are much over-estimated; he considers it sometimes effective in peripheral palsy, especially that due to lead. Stillé advocates it as a remedy in those forms of paralysis where the spinal nervous system requires stimulation, including all known as reflex paralysis. Bufalini, who has carefully examined the question, thinks it only useful in such cases as proceed solely from suspended innervation. As it requires to be given in doses sufficient to excite physiological effects, he deems it contraindicated where there is inflammatory congestion of the nervous centres (*Dublin Quart. J. Med. Sc.*, xxi, p. 495, 1856).

In *chorea* this drug was at one time, especially by Trousseau, considered to be valuable, but a few years after he held different views. Vulpian says that experience has shown this drug to have no special benefit in chorea. The convulsive action of Nux Vomica is different from the involuntary movements of chorea; the former is very rarely clonic, and when so it is jerking and unlike the manifold and grotesque movements of the latter. Nux Vomica does not excite the anæmia and rheumatic conditions so favourable to chorea.

Nux Vomica bears no homœopathic relation to *epilepsy*, the essential elements of which are unconsciousness and insensibility combined with convulsions. It is quite possible that Nux Vomica and its closely allied drug ignatia operate beneficially in removing causes which excite epilepsy, but to this disease they bear no relation of similarity; any well-attested cures must be due to some other action.

Nux Vomica presents some of the characteristic symptoms of *epidemic cerebro-spinal meningitis*, but important ones are lacking: the spinal are present, the cerebral are absent. Vomiting of a continued character, coma, delirium, and a typhoid condition are always found in the epidemic, but are not found in the pathogenesis of Nux. It is not named as a remedy in the report of epidemics treated by Horace Paine (*Trans. N. Y. Hom. Soc.*, vol. ii, 1864), nor in various reports of the treatment of these epidemics drawn up by Hughes (*Br. Hom. Journ.*, xxiii, p. 386); the only homœopathic writer who names it is W. Watson, of Utica, who includes it among many others; the indications he gives are purely spinal (*Trans. N. Y. Hom. Soc.*, ii, 1864, p. 126).

In the limited space for these comments it is impossible to enter into the minute diagnosis of various conditions of spinal disease, varying from simple congestion and irritation to inflammation of the membranes and of the substance of the cord, and to changes in its structures. Viewed antipathically, Nux Vomica and its alkaloids are therapeutically excluded from most of these affections, but regarded from the homœopathic standpoint, they are indicated whenever the symptoms can be interpreted as arising from abnormal reflex action. Hale, of Chicago, has reported a well-marked case of subacute myelitis, where strychnia, in doses varying from $\frac{1}{100}$th to $\frac{1}{30}$th of a grain, had an

excellent effect. Bähr (*Science of Therap.*, i, 117) states that in the post-mortem examinations there is no evidence that this drug sets up myelitis, though venous hyperæmia of the meningeal membranes is mentioned in most of them. In this point he is in error (vide § 75), for the evidence is marked that myelitis does exist, and also arterial as well as venous hyperæmia, together with softening of the cord. In spinal irritation, characterised by burning pain of the lumbar region, principally excited by unexpected motion, and dependent on masturbation, Nux Vomica, according to Bähr, and it may be added general experience, is a valuable remedy; he places sulphur also in the first place. When the symptoms are severe aching in the loins, uneasy feelings in the spine, weakness, heaviness of the legs, cramps, creeping feelings, numbness, attending an irritable condition of the sexual organs or bladder, Nux Vomica is well indicated; also in lumbar myalgia due to piles. In some forms of locomotor ataxy attended in their earlier stages by frequent erections and sexual excitement, Nux Vomica is indicated, and also when in these cases the bladder is a source of irritation; in the more complete form of the disease plumbum is indicated.

Perception, Ideation, Emotion.

25. Intelligence always remains intact even during the most violent paroxysms.—§ 33.
26. Anxiety and restlessness.
27. Extraordinary anxiety accompanies the tetanism.—§ 33.
28. Great anxiety, involuntary loud crying out, violent palpitations. —Obs. ix.
29. Hysterical and hypochondriacal paroxysms, § 34: sadness, sobbing, and weeping.
30. Music and singing affect him strongly, even to tears.
31. Study, mental exertion, business matters are irksome.
32. Irresolution, dawdling over business.
33. Irritability, inclined to find fault, noises worry him.
34. Hypochondriacal disposition, especially after meals.
35. Hallucinations during tetanic attacks, though perfectly intelligent; "Hold me, hold me," though a person was on either side, thinks he is fixed to the chair, yet cries out "Hold me;" state of singular agitation; uttered interrupted cries, imploring assistance.—§ 34.
36. (Apt to make mistakes in speaking and writing, leaves out syllables and whole words)?

Commentary.

§. 36. This symptom of aphasia, given by Hahnemann, is always indicative of marked cerebral disturbance, and is at direct variance with every other observer; in all probability it occurred during the treatment of some cerebral lesion, and is quite independent of the action of Nux Vomica. It is not indicated in monomania, though useful in the restlessness and agitation, jerking, &c., often present in the insane; also indicated in the trepidation, anxiety, horrors of drunkards, vide

comments under Head. It is one of the most valuable remedies in hypochondriasis, and also indicated in hysteria, but tradition has given a higher claim to its closely allied drug ignatia. Hahnemann says "it is more frequently required by those persons who are of an anxious, zealous, fiery, hot temperament, or of a wicked, malicious, irascible disposition."

Sleep.

37. Dislike to get up in the morning without knowing why; hard to waken; wakens more wearied than when he went to bed; weariness on waking, going off on rising.
38. Great sleepiness after eating.
39. Sleeplessness:—until after midnight, with feeling of heat without thirst:—from afflux of ideas, until late.
40. Restlessness at night:—after lying down in the evening, with anxiety and need to stretch out and draw up the limbs:—great, without pain:—confined to arms:—until midnight in legs, an agreeable but intolerable sensation in them, constantly waking him up, compels him to draw up and stretch his limbs alternately.
41. Sleep unquiet and full of cares:—wakens very readily, and when he sleeps dreams vividly:—cannot sleep after 2 or 3 a.m.:—talks in his sleep.
42. Great sleepiness with yawning in evening two hours before usual time for sleep; in bed goes to sleep immediately, lies awake for long time after midnight, then sleeps until late in morning, with vivid dreams full of events of previous day, and in morning will not get up from bed.
43. Yawning during the day with drowsiness:—long-continued attacks followed by exhaustion:—with shivering:—with spasmodic pains in limbs and chilliness and inward trembling:—exciting coughing, followed by headache:—with much stretching in afternoon. In the morning uncommon stretching of limbs and yawning, and after stretching a spasmodic pain in limbs, especially in knee.
44. Starting in sleep:—starts up in affright:—at the slightest noise he wakes with a start:—during the siesta it is violent, like an electric shock through all the body.
45. He often wakes up at night, and cannot readily go again to sleep; if he does sleep he dreams very vivid dreams.
46. Dreams:—sleep unquiet and full of care:—half-waking dreams, full of fatiguing thoughts:—horrible:—of maimed objects:—of vermin:—of business matters that require attention:—anxious, weeping in sleep:—and speaks aloud in sleep.
47. Lies asleep on back, one or both arms stretched above the head:—the head low. Loud snoring.

Comments.

Indicated in the broken sleep and insomnia of dyspeptics, especially when arising from alcohol or attended with flatulence. § 47:—This

position during sleep is noticeable in some cases of irritable spine and exhaustion, the same position of the hands even when awake giving relief. Hahnemann says: "This medicine is more especially suitable when the patient's state is worse in the morning and when he wakes up about 3 a.m. and must lie for several hours awake with intrusion of irrepressible ideas, and only involuntarily falls into a sleep full of oppressive dreams when the morning is far advanced, from which he wakes more fatigued than when he lay down at night, and is lazy about getting up; as also for those who several hours before bedtime in the evening cannot forbear sleeping, even while seated" (4, p. 224).

HEAD.

48. Vertigo, with obscuration of vision while eating:—after a meal or walking, ceases when standing:—when eructating:—as if he neither heard nor saw, and must fall, on coughing, sneezing, stooping:—when lying on back unable to raise head on account of:—as if he would fall sideways or backwards:—seems to pass from one part of brain to another.

49. Giddiness, ringing in the ears, confusion in the head, inability to move his legs, every effort caused pain, arms free, trismus stopping articulation.—§ 42.

50. Peculiar wandering delirium.—§ 41, *very rare.*

51. Confusion on moving, the blood seems to rush to head, with general languor; buzzing in head and ears.

52. Intoxication.—*H*, § 41. Thought he was drunk, as he had the uncertain gait, the meaningless smile, and flushed, perspiring cheeks of alcoholic intoxication.—§ 41. He grasped firmly the nearest object for fear of falling, and was greatly agitated; shortly before tetanic attack.—Obs. iv. Unable to stand, obliged to sit down upon a chair.—Obs. iii.

53. Suddenly seized with giddiness, and felt as if she were forcibly bent backwards, and as if her hands were twisted behind her. This feeling quickly passed, but left pain in back, trembling of hands, vertigo combined with nausea and vomiting of a thin colourless fluid.—§ 54.

54. Attack, after midnight; she has formication on the hands and feet, this rises, with heat in the face, up to the heart (in the scrobiculus cordis), as if it burnt and ached there; it then mounts to the throat; she feels ill and anxious; thence it comes into the head; she feels stupid in the head and has ringing in the ears.

55. When walking quickly in the open air congestion towards her head; she feels destitute of thinking power, must remain standing, the blood rushed to the heart, the upper part of the windpipe contracted, she had sparks of fire before the eyes; she did not see where she was.

56. In the morning, in the open air, her eyes became all at once staring; she lost consciousness and feeling, as in an attack of syncope, but only for a moment.

57. *Headaches* (region not indicated).—As if from emptiness :—as after a debauch, giddy heavinesss :—dull, heavy, pressive, after dinner, especially on moving the eyes :—the same in the morning :—stupid feeling in when erect, on stooping sensation as if something sank down in forehead.
58. Tearing, after a meal, with heat in cheeks and chilly feeling over the body.
59. Splitting, on moving in bed, as if head would burst, goes off after rising :—squeezing.
60. Stitches :—single strokes.
61. Tingling and shaking or bubbling in, when walking. Pain by least mental exertion :—by moving :—in bed, wakes with.
62. *Frontal region.*—Aching in, with weariness of legs, increased in open air, relieved by laying head on table :—tensive aching.
63. Burning as if beneath the bone.
64. Aching over left eye, as if from a blow, cannot open the eye :—over right orbit, in bed, lying on right side, disappears on turning to left side or back :—aching and shooting above the eyes.
65. Tearing in, from root of nose and upper jaw, increased by walking :—in crown, forehead and eyes with squeamish feeling on chest, and weakness of voice.
66. Drawing movements here and there in forehead towards root of nose.
67. Pressure and pain in, and temples, with creeping as of insects in limbs and tetanism.—§ 43.
68. *Vertex.*—Down pressive drawing, deep in head :—aching and beating, after prolonged attention :—on closing the eyes pressive pain in middle of brain, such as occurs after vomiting.
69. *Occiput.*—External, as if hair were painful :—aching in, in the morning, immediately after rising from bed :—as if brain were pressed or knocked forward :—pressive, as if occiput were pressed asunder, with heat in brain, relieved momentarily by pressure :—drawing first in temples, then in forehead, then in occiput :—drawing as if she were freezing there.
70. Boring in, vertigo, noise in ears—attending tetanus.—§ 43.
71. *Semilateral.*—In afternoon, with exhaustion :—in one side, as if nail were dug deeper and deeper in parietal bone.
72. Violent, stitch-like, in left temple, with nausea and very sour vomiting, beginning before dinner, increased after eating, relieved in evening by lying down.
73. Violent jerks all one side of, from orbit to occiput, soon after eating.
74. Pain as if right side of brain were lacerated, while lying on left side, relieved by turning to right side.
75. *Scalp.*—Painful, aggravated by touching :—the hair stands on end, and is painful to touch :—pain as if sore externally during cold wind, not painful when touched :—drawing pain :—cramp-like pains.—§ 31.
76. Stiffness in muscles attached to occiput, commencement of tetanus.—§ 31.
77. Painful papulæ and pustules (rare).

78. Obstinate and intolerable itching, following spasmodic attack.—§ 32, Obs. i.

Commentary.

Though delirium does not occur (it is only recorded in one doubtful instance), and sense of intoxication is very rare, still Nux V. is indicated in some of the effects arising from alcohol, though it may not be in complete delirium tremens. It has confusion of vision, sparks before eyes, tinnitus aurium, great sensitiveness to external impressions, easily annoyed, apprehensions without any cause, horrors, formications, undefined pains, twitchings, restlessness; it has also some hallucinations with perfect intelligence. These, with sleep disturbed by dreams, are characteristic of Nux V., and represent many symptoms of alcoholism. Roth mentions cases of drunkards who avert delirium tremens by having recourse to full doses of strychnia (*Address on Hygiene*). Hahnemann gives it a first place as an antidote to many of the effects of alcohol. The headaches indicating Nux V. are principally frontal or one-sided, attending disorders of stomach and liver, especially occurring in irritable subjects and those addicted to stimulants.

FACE.

79. Pimples on forehead and cheeks which become pustules.
80. Felt as if millions of ants ran about his face.—Obs. iii:—intolerable itching.—§ 31, 14:—creeping as of insects here and there on cheeks, which are red and hot.
81. Sense of tension about mouth, eyes, and nose, with swelling:—painless drawing, on stooping.
82. Twitching of facial muscles, evening, after lying down.
83. Electric-like shock through muscles.—§ 25. Drawing pain in masseter muscles.
84. Sensation as if jaws were drawn together though their movements remain free.
85. On chewing and pressing jaws together, shooting drawing pain towards the inner ear.
86. Slight pain, sense of stiffness in muscles which close the jaw, then trismus.—§ 30. Trismus.—Obs. iii, v.
87. A glaring, grinning, externally anxious gaze attends the tetanic attacks, eyes staring, the skin of the face, neck, and chest is greatly congested.—Obs. iv, v, vi. viii.
88. The face, previously pale, became of a very red colour, cheeks burning hot, eyes fixed, or much turned up into the head, contracted pupil, features distorted, horrible expression, mouth fast closed, grinding of the teeth, great anxiety, violent palpitation, involuntary loud crying out.—Obs. ix.
89. *Lips.*—Chaps and ulcers:—painful desquamation:—pimples, also on chin (rare).

Eyes.

90. *Eyelids.*—Above left burning pain :—right brow painful when touched :—drawing tearing pain :—quivering of.
91. *Tarsi.*—Smarting, itching excoriated feeling, especially of canthi : —eye-gum, lachrymation.
92. *Globe.*—Dryness of right :—itching, burning in, without inflammation :—bruised pain in left, muco-purulent matter in outer canthus.
93. *Eyeballs.*—Itching of :—suffused with tears, as in coryza :—prominent, projecting, with staring look during an attack.—§ 45.
94. Congestion of white ; painless.
95. Inflammation of eyes (?)
96. *Vision.*—Photophobia :—impairment of sight and distressing sensibility of eyes to the dazzling influences of light, and even flashes after the eyes had been shut, or in a dark room.—§ 48.
97. Objects appeared green.—§ 49.
98. Vision, as also hearing, becomes excessively sensitive :—increased clearness of vision.—Obs. iii.
99. Acuity of vision transiently increased ; field of vision more permanently augmented ; limits for recognition of distinct points are moved out further towards periphery.—§ 49.
100. Pupils dilated during tetanic attack, normal when that ceases. —§ 46.
101. Pupil contracted, rare.—§ 47, Obs. ix.

Commentary.

The hypodermic use of strychnia has of late years been advocated in various affections of the retina : its action here is antipathic. Nagel claims great benefit from its injection in the temple, in amaurosis not dependent on structural change, in toxical and traumatic amaurosis. He considers it even useful when there is evidence of commencing atrophic degeneration of papilla. But Leber shows that this is confined to cases where the lesion is returning to healthy structure, and excludes all where the lesion is progressive (22, p. 670). Cohn, as the results of his own experience and that of others, states it has no curative power when there is atrophy of the optic nerve. Vulpian doubts its general efficacy ; he does not admit its action can be more advantageous when strychnia is used locally than when introduced in any other way or place (24, p. 596).

Ringer also suggests that doses given by the mouth might prove just as serviceable (23, p. 594).

Chisolm, of Baltimore, reports favourably of rapid improvement established by its hypodermic use in amaurosis. Parker, of S. Carolina, corroborates this (Stillé, p. 185). On the other hand H. W. Williams, Professor of Ophthalmology, Harvard University, in his latest work writes, "The success attributed to subcutaneous injections of strychnia

seems, on careful scrutiny, to have been gained, mostly at least, in cases where a fortunate result could reasonably have been expected from a judicious general treatment without the use of strychnia" (p. 239, Lond., 1882).

Walker deems it useful in amaurosis occasioned by smoking strong tobacco, and as the result of loss of blood. He drops in a neutral solution of *Sulph. Strych.*, gr. iv to 1 oz. (*Ophthalmology*, Lond., 1879).

Chisolm found it useful in night blindness, and de Ricci used it with great service in an epidemic of night blindness occurring at the Workhouse of Ballymahon (*Dubl. Quart. J.*, February, 1858, p. 46).

Ears.

102. Itching in internal ear through the Eustachian tube, necessitates frequent swallowing, disturbs night's rest.
103. Tearing stitches :—when chewing and pressing the jaws together a shooting drawing pain towards the inner ear, almost like cramp.
104. Increased acuteness of hearing. Obs. i :—painful irritability to the slightest sound.—§ 50.
105. Tinnitus aurium (occasional). § 32 :—ringing in the ears.

Gums.

106. Swelling of, with throbbing pain :—painful swelling of, with painful papules on the interior of the lips and on the tongue, as in mercurial salivation :—swollen gums with toothache.
107. Redness of gums, inflammation of tongue, burning thirst, pain in stomach, vomiting, colic, diarrhœa.—Obs. ii.

Teeth.

108. Continued sore pain, increased by mental exertion : when walking in the open air constant ache when mouth is open.
109. Twitching synchronous with the pulse, with swelling of gums :—twitching with jerking in ear, also twisting and screwing in ear in the morning immediately on waking and in the evening. Drawing with stitches in one row of teeth, especially when drawing air into mouth :—drawing pain from warm drinks.
110. Drawing tearing, going from one tooth to another, recurs in fits, extending to facial bones and temples ; worse after eating, with flushed face, depressed and irritable :—renewed by cold water, and food getting into hollow tooth, relieved for some time by sleep.
111. Aching as if tooth were dislocated, only felt on inspiring cold air :—boring, gnawing ache, not affected by chewing, relieved by drawing in cold air, increased by warm room.
112. (Looseness of) (?).

Tongue.

113. *Speech* affected in as far as muscles of articulation are tetanically affected.—§ 30.

114. Tongue dry, much thirst, bowels confined, following recovery from tetanism. Obs. iv:—dryness in front of mouth, especially on tip of tongue:—itching on left side of:—painful vesicles on:—shooting in the tip, at noonday siesta:—redness of margins, acute pain and pulsation in epigastrium. Obs. i:—gums red, inflamed, burning thirst and pain in stomach. Obs. ii.

Mouth and Fauces.

115. Increased flow of saliva.—§ 52.

116. Inflammation of buccal cavity and tongue, thirst, pain in stomach, vomiting, colic, diarrhœa.—Obs. ii.

117. Dryness in, at night, without thirst, and yet accumulation of saliva in fauces:—dryness felt in morning as after a debauch:—in the morning lined with mucus; eye-gum:—roughness and soreness in throat, the mouth, gums, and tongue are slimy, and as if raw from something acrid.

118. Sorethroat felt when swallowing saliva, not when drinking.

119. Sorethroat in bed in morning, sensation of swelling in gullet, more felt when swallowing than when not:—single stitches on the side of throat, when not swallowing, especially felt when stooping or going upstairs:—shooting in uvula and submaxillary glands when swallowing, with shivering by day, perspiration at night and headache.

120. Aching shooting pain in throat as if plug were sticking in it, more felt when not swallowing than when swallowing:—sorethroat, sore roughness in the fauces, only felt when drawing in cold air and when swallowing.

121. Scraping feeling in the throat, such as remains after heartburn:—scraping in the fauces, not perceived in swallowing:—burning in the throat at night; she must sit up, when she lies down it is worse. Increased flow of saliva.

122. Swallowing much impeded. § 24:—she had great dislike to fluids, which she was sometimes utterly unable to swallow. Obs. ix:—a feeling of spasm in throat and stomach, with vain attempts to vomit.—Obs. xii.

123. Sour taste in mouth:—immediately after swallowing food, which tastes properly, there comes a sour taste in mouth:—bread and rolls have a sour taste, not so other food:—after milk, sourish taste in mouth:—drinking milk seems to cause acidity.

124. Disagreeable taste, sometimes herbaceous, sometimes metallic, sometimes putrid:—in the morning, with discontent and weakness:—putrid on coughing and eructating, disagreeable taste and smell in

mouth and nose:—wakes in morning with a very dry throat, and notices bad smell from throat.

125. Food, milk and coffee seem tasteless and disagreeable to him:—smell of food disagreeable to him.

126. Hunger yet loathing of food:—great hunger:—periodical ravenous hunger, if he passes over this without eating, then he feels as if full and satiated.

127. Anorexia.

128. After eating—stomach-ache, disagreeable taste:—chilliness:—flushing of face:—confusion in head:—sadness:—hypochondriacal humour:—affected by trifles:—eructations:—nausea:—vomiting:—sense of fulness even after very little food:—sensation as if a stone lay under the umbilicus, oppressing the breath:—tightness of chest:—heat of cheeks, with burning in the interior of cheeks, with very dilated pupils, photophobia, and chilliness on arms with goose skin:—great dryness at back of throat:—inclination to vomit.

129. During dinner a kind of faintness, at the same time nausea and flying heat, which all went off on lying down.

130. After dinner sudden squeamishness and loathing, followed by vertigo and tendency to faint, later tasteless eructations. Eructations sometimes painful:—desire to, frequent but without effect:—of a bitter and sour fluid.

131. Heartburn:—drinking milk causes acidity.

132. Water-brash.

133. Hawking up of salt mucus: retching or hawking.

134. Hiccough, constantly interrupting the speech, which was weak and often unintelligible.—Obs. ix.

135. Nausea:—in the morning:—in the afternoon:—before eating:—after eating:—after a meal sickish anxious feeling as if something rose up from pit of stomach:—after dinner and drinking, then thirst and distension of stomach.

136. Vomiting.—§ 54.

137. Sensation as if something turned over in stomach.

Stomach.

138. Pains in:—scraping sensations:—constant pressure in pit of:—pressure as if from a stone:—aching spasmodic pain from fauces down to scrobiculus cordis, in the morning:—pressure in, as from a stone:—pressure in pit of stomach, immediately after drinking, with distension of abdomen, and tightness of chest:—pressure in, then cutting in abdomen with constant nausea:—shortly before dinner, pain in, as if bruised, goes off after eating:—tension over, then raw sore pain in abdomen:—pain in, as if clothes were too tight.

139. Clawing spasm in the stomach after midnight, changing towards morning into a burning in:—spasmodic pain in left side of abdomen, specially in epigastrium, with nausea.

140. Epigastrium very sensitive to pressure, which excites nausea:—

great epigastric tenderness. Obs. i :—violent pains, burning heat in stomach frequently felt. § 53 :—burning pain in, and lower down, with anxiety, after supper.

141. Burning in gullet, heat in stomach; the tongue and palate are inflamed, thirst, pain in stomach, vomiting, colic, diarrhœa: preceding and following tetanic attacks: after the latter ceased, the stomach symptoms continued for four days.—Obs. ii. Acute pain in, pulsations in, edges of tongue red, dryness and heat of skin, extreme prostration.—Obs. i.

142. Throbbing in :—pulsations in.—Obs. i.

143. A cooling burning, as from saltpetre on tongue, from stomach up into the gullet, especially at night.—Spasms in stomach and gullet with vain efforts to vomit; later the spasm of stomach reappears and alternates with that of gullet, and complicated by painful jerks, like electric shocks, every time any part of the body is touched.—Obs xii.

144. Sudden attack soon after dinner; paleness of face; a nausea rises up from the scrobiculus cordis; he becomes anxious all over, with trembling and slight exhaustion through the whole body, with increasing tremor, so that he must lie down (aft. 8 d.).

Commentary.

[Dr. Black having left no comment on this and the intestinal sphere of action of the drug, I have ventured to supply the deficiency from my *Manual of Pharmacodynamics*, 4th ed.—R. H.]

"Nux acts here as elsewhere mainly upon the nerves and muscles. Hence its true place in gastric disorders. The acute dyspepsia in which it is curative is that caused by taking indigestible food. There is no particular mucous disorder; but on the other hand pain, vomiting with much retching, and frequent scanty motions with colic and urging are present. The chronic dyspepsia of Nux is essentially the same, but of course presents more variety. It is one in which the nervous and muscular energy of the stomach is defective and perverted. The food either causes pain and—less commonly—vomiting, or it lies like a load at the stomach, oppressing the brain, and soon developing much flatulence. The tongue is coated at the posterior part only: Dr. Bayes thinks this a characteristic sign for Nux. It will be seen that this is just the dyspepsia of men of business and intellectual workers, when they perform their tasks with hurry and worry, and give neither brain nor stomach fair-play. Dr. Bähr, however, would extend the sphere of Nux to include chronic gastric catarrh. The taste, both subjective and of food, is either bitter or sour; and there are eructations of the same kind. 'The appetite is gone, yet there is a sensation of hunger, which even increases to bulimia . . . The region of the stomach is sensitive, especially after a meal, and generally distended. The pains in the stomach are more especially a hard pressure, less frequently tearing or crampy pains.' He has here the concurrence of Dr. Ringer, who esteems the drug highly in those catarrhal states of the stomach which

so often complicate organic disease elsewhere, and also—from the homœopathic side—of Dr. Jousset. This excellent writer, who touches no subject without illuminating it, has published in his *Leçons Cliniques* (xvii) two striking cases of chronic gastritis cured by the drug in rare doses of a high dilution. The sub-mucous tissue about the pylorus seems to have been involved, so that thickening and obstruction occurred here, leading to dilatation of the stomach and copious vomiting. I have myself great reliance on the drug under such circumstances. In his comments Dr. Jousset characterises the three leading affections of the stomach, gastritis, dyspepsia, and gastralgia; and shows that Nux is the leading remedy for them all. It is the principal stomach medicine. In gastralgia I need hardly demonstrate its fitness, when the pain is spasmodic rather than neuralgic. This is one of the affections in which our brethren of the old school are not unwilling to take a leaf out of our book. Dr. Anstie recommended the hypodermic injection of strychnia in doses of gr. $\frac{1}{120}$ to relieve the pain of cardialgia, saying that he knew no such remedy for it as this."

Abdomen.

Hypochondria.

145. Pain, aching, squeezing:—throbbing in and under hepatic region:—contractive pain in, also in abdomen:—pricking in hepatic region.
146. Sensation of internal swelling under the short ribs:—chilly creepy feeling over hepatic region.
147. (Jaundice, with loathing of food and short attacks of faintness.)

Umbilical Region.

148. Griping and pinching, after eating, above navel:—sensation as if something drawn down from the limbs were rolled together in umbilical region, like a fulling and kneading:—severe stitches in.

Hypogastrium.

149. Squeezing bellyache and rumbling in, then watery diarrhœa quite early:—pain deep in, as from incarcerated flatus, with pains in sacrum in morning.
150. Sharp pressure, as with a cutting or pointed instrument, on bladder, neck of bladder, commencement of urethra, perinæum, rectum and anus, as if cutting flatus would force itself out at all these parts; intolerable at every step (he walks in a bent attitude, it draws him so together), rapidly going off when at rest, when sitting and lying.
151. Pressure in, as of distension, on breathing deeply, talking or touching:—pressive pain in, especially towards anus:—cutting in,

with sickness :—tearing pains from both sides, which unite above the os pubis :—a sense of contraction and forcing towards the genitals when walking in the open air.

152. Weak feeling in inguinal ring as if hernia would come.

153. (Indication and commencement of inguinal hernia) ?

154. Pinching drawing, several times, from inguinal ring upwards :—aching in region of os ilii.

Abdomen generally.

155. Sensation of weight in, as if contents would fall out :—of increased warmth in, in morning.

156. Ebullition in the abdomen from below upwards, without perceptible heat.

157. Flatulent distension :—often with rumbling in :—in the evening after lying down :—after a meal :—immediately after drinking :—rumbling in the morning.

158. Flatulence after everything he takes, seems to press upwards with anxiety :—causing cutting pain and anxiety.

159. Rumbling in and pinching flatulent colic early in bed, with heat in palms of hands and soles of feet :—flatulent colic.

160. Loud rattling in, with internal movements as if bowels were about to move, at the same time she is weak and must lie down.

161. Bellyache with dryness of lips and heat in face : with inclination to vomit : as if diarrhœa from chill would come on.

162. Pain—like needle pricks :—shootings, stitches in left side catching in breath, relieved by pressure :—pinching, tearing pain in, up towards the chest :—drawing tearing.

163. Twitching and quivering in muscles of :—twitching under the skin as if caused by live animals, in limbs and specially abdominal muscles.—§ 16.

164. After tetanic action the muscles feel as if bruised and stiff, especially on movement.—§ 37.

Alvine Evacuations and Anus.

165. Ineffectual urging to stool :—straining even after sufficient evacuation :—sensation as if fæces remained in rectum :—sometimes with sense of constriction in rectum.

166. Calls to stool three or four times daily, with pinching, frequently without result, and when something passes it is soft :—daily evacuations, but always with colicky sensations, leaving the feeling of incomplete action.

167. Pressing in rectum before a motion :—passed with burning at anus :—burning sore pain as if anus were cut, some hours after motion :—after bellyache, evacuation of dark-coloured mucus, which causes smarting burning at anus.

168. Small frequent evacuations, mostly of mucus, accompanied by fœcal motions, and straining:—copious thin fœcal evacuations following costiveness, with fruitless desire to go to stool.
169. Diarrhœa of dark colour, especially in the morning, and after midday meal.
170. Constipation.—*H*, and § 56.
171. Very dry, hard motion, and for some time after shooting pains in rectum, as if from piles.
172. Motions passed with blood:—with viscid mucus and streaks of blood:—discharge of blood, with sense of contraction of rectum.
173. Hæmorrhoids:—with burning and shooting.
174. Pains—tearing, shooting, constrictive or pressive, as if from piles, worse after eating and mental exertion: contraction in rectum, after rising:—violent aching in rectum and anus, every evening:—as if from costiveness, relieved from time to time, by discharge of flatus:—twitching in anus, unconnected with a motion:—sore pain and itching in anus, as if from piles, while walking in the evening.
175. Itching:—formication in anus.
176. Itching and aching in perinæum, after dinner.

Commentary.

[See Commentary on "Stomach" section.]

"As there are very few painful non-organic affections of the stomach which may not be helped by this precious medicine, its virtues display themselves in the intestines in like manner. It is quite homœopathic to spasmodic colic from flatulence; but other medicines—as colocynth and cocculus—are more frequently used. *Constipation* is a well-known indication for Nux Vomica in complex cases. As an idiopathic affection, moreover, it frequently requires this remedy. You may think that the use of Nux must be antipathic here, as constipation means atony of the intestines, and Nux is excitant and not depressant thereto. The therapeutists of the old school recommend it on these grounds. But I must point out that constipation by no means always depends upon atony of the intestines. Schroeder van der Kolk states that 'long experience and a great number of post-mortem examinations have satisfactorily proved to him that chronic constipation is almost always dependent on constrictions in the descending colon.' And of the Nux constipation Dr. Carroll Dunham well says, 'This medicine does not diminish the action of the intestine. It rather increases it, but at the same time renders it *inharmonious* and *spasmodic*—a hindrance, therefore, and not a help to evacuation. This is the reason why the constipation characteristic of Nux Vomica is accompanied by frequent ineffectual desire for stool—the action of the intestine being irregular and spasmodic, and the constipation resulting from the irregularity of action, and not from inaction.' It is probably in a similar way that Nux occasionally relieves ileus, and incarcerated, or even strangulated hernia. Dr. Imbert-Gourbeyre has studied the subject in *l'Art Médical* for 1860; and numerous illustrations of this property of the

drug exist in homœopathic literature—Trousseau and Pidoux themselves admitting that the claim has been substantiated. Probably also the benefit occasionally obtained from this medicine in dysentery is due to its control over the tormina and tenesmus—which are nervo-muscular—rather than from any action on the mucous membrane. There is a form of diarrhœa, moreover, in which the undoubted usefulness of Nux seems explicable in this way. It is where artificial food disagrees with infants so far as to cause vomiting and purging, but without setting up actual gastro-enteritis. Here I suppose the same irritable state of fibre to be present which in the adult induces constrictions which impede free evacuation; but in this case it leads to impatience and frequent emptying of the intestinal canal. Dr. Guernsey regards the muscular irritability of the rectum of which I have been speaking as a 'key-note' for the choice of Nux in affections of its neighbour, the uterus.

"The action of Nux upon the portal circulation has been largely used in the school of Hahnemann. I cannot go so far as Bähr, who thinks that the drug has a more specific relation to the liver than to the stomach; but its hepatic influence is undoubted. In recent hyperæmia of this organ; in general abdominal plethora; and in hæmorrhoids, large and blind, hence resulting—Nux is an excellent remedy. In the two latter affections it is much aided by sulphur."

Urinary Organs.

177. Urging to urinate:—while urinating—burning and itching in urethra:—burning, and tearing in neck of bladder:—discharge of viscid mucus, without pain.

178. Urine more abundant, passed much more frequently, and with more vigour.—§ 59.

179. Before urinating—burning, pricking pain as if sore.

180. When not urinating—tearing pain in urethra:—aching pain at orifice with shivering:—contractive pain in anterior portion of urethra, when reflecting.

Commentary.

Indicated in some forms of strangury: in irritable bladder occurring in the gouty, in that attending an attack of piles: in that attending the early stages of spinal disease.

The glycosuria occurring in the long-continued tetanism of frogs cannot be taken as indication for its use in diabetes (§ 59). Its employment in this disease has very much of empiricism to recommend it, though not justified on antipathic or homœopathic grounds. In diabetes of a peptogenic origin it promises most relief: it has been used under these circumstances, with fair success, in small doses of Nux Vomica by the homœopathic, and in full doses of strychnia by the ordinary school; (e.g. *Dickinson, Dis. of Kidneys*, 1875, p. 135).

Male Genitals.

181. Smarting itching of glans and prepuce :—discharge of mucus from urethra.
182. Troublesome erections, day and night, *H*, and § 42 :—increase of sexual excitement, slightest touch rousing excitability.—*H*, § 42.
183. Sexual desire, but during coitus erection ceases :—after coitus dry heat of the whole body, dryness of mouth without thirst. Nocturnal emissions :—without erections :—with lascivious dreams followed by great coldness of feet.
184. *Testicles*, stitches in, constrictive pain.

Female Genitals.

185. Burning in, with increased sexual desire :—aphrodisia.—§ 42.
186. Discharge of yellow mucus.
187. Catamenia appear too early :—though before proper time are scanty :—during—nausea, chilliness, faintness :—faintness, headache as if eyes would fall out, shivering, an hour after burning heat and dry lips :—out-pressing pain in side of abdomen :—pain in left arm and right thigh :—crawling sensation upwards in gullet, evening after lying down :—forcing outwards :—contractive spasm in abdomen and uterus, like a clutching, with metrorrhagia, in clots.
188. Labour-like pains—§ 42. For other pelvic pains vide Back.

Commentary.

Though aphrodisia is present, there is not an actual gain in vigour (note sympt. 183) : it is due to great irritability of the sexual organs, the muscles of which are often affected tetanically. Indicated in the painful erections and excitement of gonorrhœa :—in tendency to emissions attending an irritable state of the organs, and especially when hypochondriasis is present : not indicated homœopathically in impotence except when that is due to over-irritability of the organ. A valuable remedy in over-frequent and profuse menstruation, especially when complicated with hepatic and hæmorrhoidal congestion, or hysterical and irritable condition. Hahnemann says, "If the menses usually come on some days too soon, and are too copious, the ailments remaining or occurring after their cessation are quite suitable for Nux Vom." (4, p. 223).

Respiratory Organs.

Nostrils.

190. Borders of, painful as if ulcerated :—inside of, painfully sensitive.
190*a*. Coryza :—fluent by day, dry at night :—with scraping in throat,

crawling and scratching in nose, sneezing:—with catarrh of larynx: —in the morning stuffed coryza with extreme dryness of mouth: —continual heat in the nose and frequent attacks of coryza:—itching in the stopped-up nose, as in coryza.

191. (Prolonged epistaxis) (?)

192. Increased acuteness of smell, § 23:—as if of rotten cheese, *H*:—sulphurous smell, *H*:—substances with a repulsive odour, *e.g.* garlic, assafœtida, smell sweet and agreeable.—§ 23.

Commentary.

§ 191.—This symptom of Hahnemann's is marked very doubtful, as it is unsupported by any other observer. Hahnemann gives increased acuteness of smell, but in a note he considers it merely the curative effect on a previous opposite condition. It may have been where he noted it, but it is probably also a direct physiological effect of Nux V. The perversion of smell is noted by several observers.

LARYNX AND LUNGS.

193. Spasm of the glottis.—§ 64.

194. Dry painful catarrh with heat of feet and hands, followed by general perspiration, and loosening of catarrh:—catarrh in chest, hoarse roughness in chest, painful spot in larynx, with viscid mucus in upper part, causing cough, and difficult to detach.

195. Cough which returns with violence every other day:—dry nocturnal cough, preventing sleep:—worse on the back, goes off on lying on left side.

196. Cough excites—bursting headache:—bruised pain in epigastrium: —pain in larynx:—heat:—pains and sensations in thorax.

197. Asthmatic constrictive tightness, transverse, when walking and going up hill. Tightness in chest:—as if clothes were too tight, on going up stairs, relieved on sitting down:—morning and evening:—after dinner, he must draw a deep breath slowly, some hours afterwards shortness of breath, rapid breathing:—on lying on the back, morning; on turning to right side, headache.

198. Breathing oppressed, after dinner, as if stone lay under the navel: —a disagreeable feeling of difficult breathing mounts up from epigastrium:—breathing difficult and tight when sitting up, natural on lying down.

199. Thoracic muscles generally about the first to be affected with a sense of stiffness and contraction which goes on to complete tetanus, the respiration becoming more and more impeded, the face becoming of a dark red, livid hue, palpitation of heart, quick irregular action, eyes staring, pupils dilated, copious perspiration.—§ 30, 35. Pressure: —as if compressed by a weight, in the open air:—transverse across chest with short breathing:—as if sternum were pressed in:—anxiety in chest:—with burning.

200. Pains—aching :—immediately after eating :—in left side of, on sitting a little, immediately goes off on eructating :—shooting, especially about middle of chest :—burning in, with anxiety.

201. Heat in chest : which rises up to the mouth, causes restlessness, anxiety and sleeplessness :—with tension of.

202. Throbbing, external, and internal, with fine shootings in pectoral muscles.

Commentary.

[The remarks on the "Stomach" section apply also to this.]

"In disorders of the respiratory organs Nux Vomica plays a much less important part than in those of the alimentary canal. It is very good, however, for dry coryza—the so-called 'stuffy cold;' and for violent coughs, with little or no expectoration, jarring the head, and straining the abdominal muscles. Nux is obviously homœopathic to spasmodic asthma; and frequently plays an important part in its treatment. There is a brilliant case on record treated by Hahnemann in his early days, which teaches us that the medicine need not be used in infinitesimal doses for this malady at any rate. It may be read in his *Lesser Writings*. Dr. Kidd, also, states that he considers Nux our best anti-asthmatic. I think it best suited to purely spasmodic cases, where there is no bronchial lesion, but a standing reflex excitability of the pneumogastric to impressions made from without or through the stomach. I prefer here the lowest triturations."

Cardiac Region.

203. Palpitation of heart :—after dinner on lying down :—with ebullition of blood, early in morning.

204. Painful blows towards the heart, synchronous with pulse :—stitches in.

205. Attack, in the evening; it rises to the heart; he feels ill and anxious; he trembles and he must rest his head bent forwards on the table.

206. Quick irregular action and often violent palpitation during tetanic paroxysms, and also during the intervals.—§ 63.

Commentary.

The cardiac disturbance is hardly observable, except during tetanic paroxysm. Useful in palpitation and uneasiness at heart attending flatulence and some forms of hypochondria.

Skin.

207. Eruptions, not described.—§ 66. Inside of thighs and arms, also side of neck, of scarlet colour, as in scarlet fever.—§ 66. Anomalous eruption mostly on paralysed side of body, other side free (9, p. 1297).
208. Intolerable and obstinate itching affecting every part, especially the scalp.—§ 66.
209. Anæsthesia, very rare.—§ 67.
210. Copious perspirations during and after tetanic attack.—§ 67.

Commentary.

Cutaneous action not marked. Indicated in prurigo senilis, comp. with rhus, arn., ars. Bähr states it is recommended by some as a special remedy in erysipelas of lower extremities (*Sc. Therap.* ii, 461).

Back.

211. *Pain*—persistent burning shooting between scapulæ :—constriction :—shooting when moving and breathing :—when walking and sitting, not when lying :—tearing, dragging in loins :—burning tearing :—drawing pain from nape downwards, when sitting, at the same time clawing-like pain in epigastrium, so that she must sit in a bent position :—bruised, more painful when touched. Aching in loins up the spine, with anxiety, immediately after supper, in the morning after drinking same pain, with a sense of pressure on hypochondria, as if flatulence were displaced.—Drawing from loins into back combined with paralytic stiffness.
212. Sense of heat, of glow of skin, especially down the spine.—§ 24.
213. Violent tetanic spasm, head drawn backwards, the jaws firmly clenched, the arms extended.—§ 26. Stiffening of muscles of back, leading up to tetanic spasms, the muscles of back, trunk and abdomen getting as hard as boards, the head bent backwards, so that the whole body is arched.—§ 35.
214. Opisthotonos the most common. Obs. iv, v, vi :—emprosthotonos and pleurotonos, Obs. x (both rare).—§ 35.
215. After the attack the affected muscles are weak, stiff, feeling as if bruised and tender to pressure.—§ 37.

Sacrum.

216. Pain in pelvic region as if dislocated, on moving :—bruised and beaten, also in knees, unaffected by rest or movement :—bruised weak feeling in, as after a confinement :—nocturnal pain in, preventing her

turning :—in sacrum and ischia a jerking dull shooting, preventing her turning in bed :—she could not lie still, nor cough, on account of this painful jerking :—contractive, extending to sides :—stitch in, on turning upper part of body, catching the breath.

216*a*. Throbbing, painful, with eructation and rigor.

Cervical Region.

217. Cracking of cervical vertebræ, on moving the head :—the joints are painful.

218. Left side of cervical muscles are swollen and painful when head is moved, as if tendons were too short. Drawing pain in the nape : —as if weight lay there, in the morning :—tearing in, in fits, in the evening.

219. Pain at last cervical vertebra, as if flesh were torn away, cannot bear his shirt to touch it.

220. Muscles are often tetanically affected ; for further symptoms vide *Motility*.—§ 24.

Commentary.

The symptoms may nearly all be ranked under tetanism. See comments to Motility as to therapeutic uses. Useful in some forms of lumbago, especially when attendant on the presence of uric acid, of oxalates in the urine ; also on piles : also occurring in some intermittents.

Upper Extremities.

221. Pains in upper shoulder-joint :—bruised in, and scapula, on moving head toward opposite side :—on account of which cannot raise arm : —as if torn in left shoulder-joint, relieved by lying on the pained side :—about 3 a.m. indescribable pain in shoulder-joint on which he lies, goes off gradually on turning to opposite side, with general perspiration :—pain in, as if palsied, whole arm feels heavy and tired sitting and walking :—as if bruised and tired :—rheumatic pain and in deltoid.

222. Tetanic spasms affect the whole extremity, commencing as in other parts with heaviness, stiffness, electric-like shocks, pricking, numbness, twitching, formication and then tonic spasm, leaving a bruised fatigued feeling with tenderness to pressure.—§ 30.

223. Pains :—drawing pain :—with paralytic stiffness :—contracting, boring at elbow when she lies on opposite side :—drawing with stitch in fingers :—as of dislocation in right wrist, on moving and extending the hand :—drawing in fingers :—twitching shooting backwards in direction of thumb-bones :—burning in ball of thumb, on lying down, after dinner :—in finger-joint as if after severe labour and as if tendons were too short.

224. Sensation of a sudden powerlessness of arms and legs in the morning:—he had no power to write with the hand.
225. Tendency of arms and hands going to sleep.
226. (Thumb apt to get dislocated when moved.)
227. Heat in hands early in morning, which he endeavours to cover up, for if they get cold he has intolerable pain in them:—in mild weather fingers are in part red and frozen with burning-itching, especially on coming into a warm room or into bed.
228. Perspiration of hands, while walking in the open air.

Commentary.

§ 224.—This symptom of powerlessness is considered under Lower Extremities. Symptom 227 and 244 under Lower Extremities are interesting, coupled with Anstie's remark (§ 62) as to the therapeutic effects of small doses of strychnia in increasing the activity of the systemic circulation, and diffusing a comfortable feeling of warmth. Probably the above symptoms represent the primary physiological action, and those named by Anstie the therapeutic results. Ringer quotes Anstie's recommendation of it in troublesome coldness of hands and feet (23, p. 601). In the treatment of chilblains Nux V. has long held a place in homœopathic treatises.

Lower Extremities.

229. Shooting and twitching frequent from feet up to hips, when lying on the back, goes off when he lies on painful side.
230. Thighs—frequent quivering in muscles of thighs:—a down-drawing sensation:—wearied drawing, and in calf, painful when walking:—at night coldness of the thighs, they do not get warm even in bed:—tearing and shooting a little above and below the knee, in the evening.
231. Tottering and unsteadiness of lower extremities:—the legs are not able to support the body, he must lie down:—sensation of sudden powerlessness of legs and arms, in morning:—from moving onwards heaviness and fatigue of lower extremities, so that they are painful when walking:—stiffness of, with twitchings.
232. Boils on the thigh, with violent shooting pain (?)
233. Twitching and quivering in the limbs under the skin.
234. Lower extremities go to sleep when sitting at dinner:—go to sleep after sitting and standing, on contact shootings:—the feet and toes also go to sleep.
235. Frequently during the day, when she has been seated and wishes to get up, she gets a cramp in the soles, she must stretch out the foot in order to relieve herself and run, in order that it may go off by movement; at night she cannot go to sleep on account of painful cramp in the soles, which occurs as soon as she draws up the feet and bends the legs:—spasmodic contraction of toes when yawning.

236. Painful cramp-like contraction of soles when legs are bent, which goes off on stretching out legs :—cramps of toes in bed after midnight.

237. In the soles, burning pain :—when lying, after dinner, tearing in the soles (preceded by a burning in the thumb-balls) :—stitches :—in heels stitches.

238. A dull numb pain (numbness) in heel, as after a high leap.

239. Pain as if the shoe were too tight and pinched, and as if the soles were tired and sore from walking :—on the side of the foot and toes, as also in the upper part of the toes, pain like burning, and as if the shoe pinched, in the evening.

240. Pain of the corns on the toes.

241. Tetanic spasms and cramps preceded by sense of heaviness, stiffness, weariness, twitchings, electric-like shocks, followed by bruised, wearied feelings, and tenderness to touch.—§ 30.

242. The trunk stiff, the legs extended, the feet turned outwards, the toes flexed to the plantar surface.—§ 25. Her whole body was straightened and stiffened, the legs pushed out and forced apart :—impossible to bend the thighs on the pelvis. Obs. vii :—The whole body becoming as stiff as a board, the lower extremities extended and stiff; the soles of the feet concave. Obs. xiii.

243. Formication and violent itching all over limbs, as also other parts of body. § 32 :—The formication in legs changed into cramps. Obs. xii. (See also *Motility*).

244. Itching burning on toes, as if they had been frostbitten, especially when he comes into a warm room, or into bed :—going to sleep of both big toes :—spasmodic contraction of the toes and of fingers when yawning.

245. Pain as of ulceration at root of toe-nails.

Commentary.

The symptoms 231 and corresponding one under Upper Extremities 224, are not to be regarded as signs of paralysis; they are the signs of commencing tetanism of the muscles, or the results of severe tetanic contraction. Under Motility it is shown that Nux Vomica has no paralysing influence over the motor nerves. These symptoms indicate its use in muscular exhaustion; or when they occur in spinal disease characterised by great reflex irritability. It is a valuable remedy in fidgets and restlessness, in cramps, in jerking and twitching of the limbs. It is indicated in some form of affections of the sciatic nerve occurring in those of gouty habits and hæmorrhoidal tendencies, especially with diffused cramp-like pains and sense of weight, attended by restlessness.

PLUMBUM.

BY

FRANCIS BLACK, M.D.

PLUMBUM.

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Syn.—Lead. Latin, *Plumbum*; French, *Plomb*, also *Saturne*, adopting the name given to it by the alchemists; Italian, *Piombo*; German, *Blei*; Spanish, *Plomo*; Dutch, *Loot*; Russ., *Swinetz*.

1. *Chemistry.*—A metallic element, atomic weight 207, sp. gr. 11·44, symbol Pb. It rarely occurs native; it is of a blueish-grey colour, soft and sectile, easily rolled out; its tenacity is slight; rubbed on paper it leaves a streak. A freshly cut surface is very brilliant, but it rapidly tarnishes. It crystallises in octahedrons; it melts at about 325° C., 617° F., and volatilises at a red heat; when melted it rapidly oxidises, the oxide forming a yellow powdery coating; at a higher temperature the oxide melts and protects the metallic surface from further action.

2. The ores of lead may be divided into oxidised ores and the

sulphide; from the latter (*Galena*) most of the lead of commerce is obtained. The oxidised ores are the carbonate of lead, or *Cerusite*, which occurs in white fibrous crystals; the sulphate of lead, or *Anglesite*, which also occurs in crystals; the phosphate of lead, or *Pyromorphite*, which frequently occurs massive; and the arseniate of lead. These ores are mixed with coal or coke and a suitable substance to form a flux; the whole is then heated either in reverbatory or cupola furnaces, when reduction speedily takes place, and the melted metal runs from the tap-hole. Many specimens of lead which contain a sufficient quantity of silver are submitted to a desilverisation process.

3. Pure water in contact with air, or a very moist atmosphere, very rapidly and extensively acts upon lead, oxide is formed, carbonic acid is absorbed, and in a short time the metal becomes transformed into a white flaky powder, composed of hydrated oxide and carbonate of lead. The presence of a very small quantity of salts (except the nitrates arising from organic matter) in the water prevents the formation of the hydrated oxide.

4. Lead and oxygen form various oxides.

5. *Protoxide of lead* (PbO) is met with in commerce under the names of *litharge* and *massicot*. It is a pale yellow or reddish crystalline scaly mass, sp. gr. 9·3, melting at a red heat to a dark red liquid. It dissolves in acids, forming salts which are usually very crystalline. It is soluble to a very slight extent in pure water; its solubility is diminished by the presence of salts, such as sulphates.

When ground it is used as a pigment by painters and decorators, also in the manufacture of acetate of lead, and sometimes it enters into the composition of glazes used at glassworks and potteries.

6. *Red oxide of lead* (Pb_3O_2), known as *red lead* or *minium*, is a scarlet crystalline powder, sp. gr. 8·6 to 9; it acts as a powerful oxidising agent; it does not form salts. It is extensively used as a pigment by the painter, the paper-stainer, and in the manufacture of flint glass.

7. *Acetate of lead.*—Lead forms a normal and several basic acetates. The former, known as *sugar of lead*, *eau blanche*, *sucre de saturne*, *extrait de saturne*, is a white crystalline salt, having a sweet astringent taste; its formula is $C_2H_3O_2Pb$. It has long been used medicinally under the name of Goulard's Extract, and a solution of the salt is frequently used on account of its property of precipitating many vegetable substances, such as gums and colouring matters. It is, with the exception of lead manufactories, the most fruitful source of poisoning either in its pharmacopœial form or as acting through various cooking vessels and acid drinks.

8. *Carbonate of lead, white lead, blanc argent, ceruse* (Pb_2OCO_2).—This hydrated carbonate is formed by the absorption of carbonic acid by metallic lead in the presence of oxygen and acetic acid. It is insoluble in water, but easily soluble in nitric or hydrochloric acids. White lead, as met with in commerce, generally contains about 7 per cent. of linseed oil; it is also met with as a heavy, white, amorphous powder. It forms the basis of nearly all the pigments used by the house-painter.

9. *Nitrate of lead*, the normal salt, has the composition $Pb_2ON_2O_3$; it crystallises in large white octahedrons, soluble in eight times their

weight of cold water, and in much less of hot water. It is occasionally used in solutions as a disinfectant to destroy sulphuretted hydrogen and sulphuret of ammonium.

10. *Chromate of lead*, $PbCrO_2$, is found native in translucent yellow reddish crystals, known under the name of *red lead ore*. Artificially prepared it is a yellow insoluble powder, and is much used as a pigment under the name of *chrome yellow*. There is also a basic chromate of a deep orange-red colour, known as *chrome red*. These chromates when used to colour sweetmeats have given rise to dangerous results.

11. *Sulphate of lead*, $PbOSO_2$, occurs native as anglesite; it is formed as a white precipitate on adding sulphuric acid or a sulphate to a lead salt. It is a heavy powder, insoluble in water; suspended in water, with the addition of alum, it constituted the *lait virginal* of old writers and proved a most dangerous cosmetic. In the condition of a protosulphide in hair washes it now not unfrequently gives rise to lead-poisoning.

12. *Chemical tests.*—The formation of arborescent crystals of lead, by suspending a piece of zinc in a solution of acetate of lead. The formation of iodide of lead, by adding a few drops of iodide of potassium solution; the precipitate dissolves when heated, and is deposited again on cooling, in beautiful golden yellow scales. The hydrosulphuret of ammonia, or sulphuretted hydrogen gas, is a very delicate test, producing a black precipitate even when less than the 100,000th part of the salt is dissolved. Tardieu recommends as the surest and simplest test the reduction of the suspected substance by the addition of a little carbonate of soda, placing it on charcoal and acting on it with the blow-pipe. Brilliant metallic globules appear, and the side of the charcoal becomes covered with the grey oxide. If this be scraped off, rubbed with distilled water in an agate mortar, then the liquid carefully drawn off, on the mortar and pestle will be seen minute metallic points (8, p. 879).

When lead is mixed with organic matter or present in the animal tissue, it is necessary to destroy these by nitric acid or cremation before the ordinary tests can be used.

History.

13. Lead has been used by the Greeks and Romans as a medicine and in various manufactures, but they appear to have been ignorant of its peculiar effects, only cognizant of its action on the stomach. Vitruvius, an architect in the time of Augustus, forbids the use of this metal for conducting water, because ceruse, he says, is found in it, which is hurtful to the human body (3, p. 515).

About the commencement of the seventeenth century attention was drawn to the peculiar colic of Poitou, which was then attributed to the sour nature of the wine. Musgrave, in 1703, wrote on the colic in Devonshire, and a much fuller report of the same is supplied by Huxham (1739), who shows its similarity to the colic of Poitou, and gives a fanciful theory of its cause. To Sir George Baker (1767) is due the merit of demonstrating the cause of these colics, proving "how

the cyder became contaminated with lead, and how the poison of lead may be supposed frequently to gain admittance into the human body, unobserved and unsuspected" (1, p. 257). He speaks not merely of the colic, but of the paralytic symptoms which lead produces.

Omission must not be made of Stockhausen, who as early as 1656 seems to have had a very correct knowledge of lead disease. Haller (*Bibl. Med. Pract.*, iii, p. 52) thus summarises his observations:—"Novum morbum describit; primum quidem a plumbo natum, cum immenso alvi dolore, eaque pertinacissime obstructa, cum cardialgia, syncope, inflammatione intestinorum, urinæ suppressione, deinde cum membrorum paralysi et convulsione et universi corporis atrophia."

Merat, in 1812, published his treatise *De la Colique Metallique*, and Orfila added much to the knowledge of lead-poisoning in his *Toxicologie*. The effects of lead on the nervous system were not much noticed until after Merat's work; he considered them independent of lead. Grisolle, in 1836, fully and clearly traced their history, and described the principal forms (5). Tanquerel three years later published what was then and still is the fullest and best work on chronic lead-poisoning. It is to be regretted that he adopted Grisolle's nomenclature of the cerebral affections without making any acknowledgment of the source from which he drew the information.

Few direct experiments have been made on healthy persons to ascertain the effects of lead; two were made by Drs. Spence and Laidlaw (*vide* Obs. xiii, xiv), and a series under Hartlaub's care (23). The value of the last is, however, much diminished owing to the omission of the doses and details as to the order of the symptoms.

14. *The history of the therapeutic uses* of lead are principally accounts of its employment externally for ulcers, internally for excessive mucous and purulent discharges, excessive sweating, and hæmorrhage; and to these uses it is still principally confined, except by the homœopathic school. It is interesting to find that several of the therapeutic uses indicated by the homœopathic rule have been anticipated by practitioners of the ordinary school.

Mayerne, Saxtorph, A. T. Fayermann, &c., have employed it in various nervous diseases. Gardner (*Lond. Med. and Phy. Journ.*, July, 1830) recommends it in idiopathic nervous pains, without inflammatory complications, especially in neuralgia of the internal organs. M. Levat-Perotton (*Observ. sur l'emploi médical de l'acétate, et du sous-acétate de plomb, &c., dans quelques nevroses du cœur et des organes de la génération, &c.*, Marseilles, 1829, in 8vo) reports fourteen cases of neuralgia of the heart cured by this remedy, and also cases of hysteria and neuralgia of the genital organs relieved by the acetate of lead. Tanquet de Mayerne gave it in vertigo. It has been beneficially administered in epilepsy by J. Agricola (*Dict. Universel de Mat. Med.*, iv, p. 364), by Dr. Rush (*Philadelphia Med. Museum*, vol. i and xi, quoted by Coxe, *American Dispensatory*, p. 476), by Dr. Eberle, who gave it to children in doses of two grains daily (*Lond. Med. Repository*, vol. viii, p. 178; *Gaz. de Santé*, 21 April, 1817); also by Kopp, Saxtorph, and Osterdyk Schaacht. Morgagni (*De Sedibus*, &c. Epis. viii, No. 10) quotes Etmüller as having obtained good results from the acetate, cautiously administered, in

melancholia and hysteria; in the latter affection it has also been beneficially given by Pallas and Saxtorph. Tachenius recommends it in hypochondria. A. T. Fayermann (*Bull. des. Sc. Méd.*, iii, p. 291), Dugas (*Journ. de Chimie Méd.*, iv, 506) and Dr. Chatard, of Baltimore (*Dict. Univer. de Mat. Med.*, t. v., p. 394) each report an instance of its successful administration in declared hydrophobia. Tachenius and Hoffmeister employed it in dry, convulsive cough. Dr. Harlau, of the United States, gave it beneficially in irritability of the digestive organs. O. Crollius (*Basilica chymica*, p. 472) recommended his Oleum saturni in white wine, and Béguin the acetate of lead, as valuable in ordinary colic.

Pereira observes: "There are some cases in which experience has shown acetate of lead is occasionally serviceable, but in which we see no necessary connection between its obvious effects on the body and its remedial powers; as in epilepsy, chorea, &c." (*Mat. Med.* i, p. 809).

On the 13th of January, 1873, Dr. Thorowgood detailed to the Medical Society of London a case of obstruction of the bowels in which opium was given with success, but he attributes the chief benefit to *Acetate of lead.*

"The intense twisting pain at first seemed to point to a possible intussusception as the commencement of the trouble. To relieve this *belladonna* was tried, and this not succeeding *Acetate of lead* was added in the hope that, *as lead acts powerfully on the muscular coat of the bowel so as to alter its calibre*, it might in some way aid in untwisting the invagination."

One case was mentioned in which *Acetate of lead* given thus had succeeded in affording relief, and in the present case, after as much as five grains were given, copious relief followed.

A study of the pathogenesis of lead throws light on the connection which Pereira did not see, and which Thorowgood does not state very clearly.

Introduction to the Physiological Action.

15. The salts of lead produce acute or chronic symptoms, according to the manner and quantity in which they are introduced into the system. All the preparations of lead may, qualitatively, be considered to have the same action; but from this list it is well to exclude the compounds with chromic and arsenious acid. The sulphuret is the most innocuous. The results of therapeutic use, of the accidental and of the rarer intentional poisonings, bear principally on the acetate, subacetate, and carbonate of lead. The carbonate in the shape of white lead, the oxides, as litharge and minium, from their very general employment in manufactures, are the principal causes of poisoning among workmen. Many cases are recorded of poisoning from drinking rum, wine, cider, vinegar, lemonade and water which in their preparation or their storage have come in contact with lead or some of its components. Attention having been drawn to such poisonings, the care now used in employing proper machinery in preparing those articles has much diminished the risks. In this country house-painters

and workmen in lead manufactories furnish the most frequent cases. In proportion as lead paints contain a large proportion of turpentine, so do they, from the facility for evaporation, act more readily on the system. Christison has drawn attention to the curious and not sufficiently explained circumstance that the action of lead on house painters is more common in some towns than others. It is almost unknown in Geneva, not at all common in Edinburgh, whereas in Paris and in London many workmen suffer from it (3, p. 564).

16. Metallic lead, in minute division or in the state of vapour, acts on the human system. Lapidaries and filers of lead types, who are exposed to and inhale minute particles of lead, are affected with all the train of symptoms peculiar to the compounds of lead (7, i, p. 52). Printers and polishers of mirrors are similarly affected. Metallic lead in the shape of shot has sometimes given rise to serious symptoms. Bryce narrates a case of a man who swallowed three ounces of shot in three days, and suffered severely (*Lancet*, Dec. 31, 1842). Similar results are afforded in a case reported by Ruva, where a man, suffering from ague, took six ounces of shot. The instances of serious symptoms, even of death in the case of the Superior of the Jesuits at Dole, from drinking wine from bottles which had been scoured with lead shot, are attributable to its conversion into carbonate of lead (10, p. 37).

17. The danger arising from drinking water conveyed or stored in lead pipes and cisterns has led to much discussion, 1st, on the minimum amount of lead in water which is compatible with safety to health; 2nd, what waters afford the greatest protection against lead.

18. The chemists appointed by Government to determine on the lead contained in Dr. Scoffern's patent for refining sugar, came to the conclusion that 1·261 grains of lead would be administered to each individual weekly, and that this quantity would be very likely to prove highly injurious to health—that it might, in fact, in the course of a few months, give rise to alarming symptoms of poisoning. In support of this they referred to the fact that at Claremont thirteen persons were poisoned in the course of seven months by using water which contained 1 gr. of lead in the gallon. Mr. Herapath, of Bristol, states that water containing no more than the 1,500,000th part of lead, or in other words 1 gr. in seven gallons, cannot be used as a beverage with impunity; and he mentions a circumstance where lead in the above proportion produced indigestion, loss of appetite, flesh and colour (*Br. For. Med.-Chir. Rev.*, 1851, p. 87).

Some authorities consider that water containing $\frac{1}{40}$th gr. in a gallon of water is unsafe. Hoffman, Graham and Miller give the minimum of lead which can exist without injury as $\frac{1}{57}$th gr. per imperial gallon of water (*Rep. on Water Supply of Lond.*, *Quart. J. Chem.*, no. 16). Dr. T. Smith, of Aberdeen, states that less than $\frac{1}{20}$th gr. per gallon produces no deleterious effect. But this statement is contrary to general experience. Adams has shown that water containing $\frac{1}{100}$th per gallon has produced lead disease. At Tunbridge Wells, in 1814, many persons were affected with colic, &c., from drinking water which had been conveyed a quarter of a mile by leaden pipes. Brande was enabled to discover traces, but the quantity was so small that Scuda-

more, Thomson and Prout were unable to detect any lead. Yet after the substitution of an iron pipe no case of colic appeared (3, p. 529).

19. What water affords protection against lead? Distilled water, rain water and water containing organic matter act readily on lead. All natural waters, with the exception of a few highly charged with sulphates, act upon bright lead to a greater or less degree, producing oxides or chlorides. In the case of the most potable water, the action on the pipes soon becomes almost imperceptible.

The purer the water and the greater its aëration so is its action greater on lead. If water is heated the danger of lead impregnation is increased.

20. Nitrates increase the solubility of the oxide of lead in a greater degree than other salts. Sulphates and silicates alone do not dissolve the oxide.

21. Christison was the first to show that the small proportion of salts in some natural waters afford protection against the action of heat by slowly forming a firm coating of carbonate of lead. The feeble action of the Edinburgh water on lead arises from its containing about a 12,000th part of its weight of salts in solution, about two thirds are carbonate of lime, and one third consists of the sulphates and muriates of soda, lime, and magnesia (3, p. 528).

22. It is considered that a limited amount of carbonic acid affords protection by forming an insoluble carbonate of lead, but the possible danger is that an excess of carbonic acid will dissolve the crust of carbonate.

23. It was supposed that the formation, after a few days or at most weeks, of an insoluble suboxide would afford protection. The results in the case of water supplied to Boston, U.S., have shown that this cannot be depended on (20).

24. Lead surfaces alternately exposed to air and water, *e.g.* lead suction pipes of wells, are always possible sources of danger.

It must also be remembered that water may be free from lead to-day, and in a few days, owing to heavy falls of rain, the presence of organic matter, the contact of fumes, continued storage and mechanical disturbance of the surface of the lead, show decided traces of that metal.

25. It is therefore desirable that no water for drinking or cooking purposes be conveyed in lead pipes, and especially never stored long in leaden cisterns. Inattention to this last circumstance has several times been the cause of lead-poisoning. Merat observed that the water in Paris, which in ordinary circumstances has a trifling action on lead, when kept for two months in a leaden pneumatic trough, yielded from about 1000 pounds of water two ounces of finely crystallised carbonate of lead (2, p. 98). Christison gives a similar experience as regards the Edinburgh water (3, p. 532).

26. *Dose.*—Nothing is accurately known concerning a fatal dose, say of sugar of lead. If two or three drachms are taken serious consequences are likely to arise, especially if it is swallowed in solution. Instances of recovery are on record where as much as an ounce has been taken. The acetate is given therapeutically in doses of from 1 to 12

gr. Christison has given as much as 18 gr. daily for eight to ten days without any unpleasant symptoms except once or twice colic. Taylor says 30 and 40 grains have been given daily in divided doses without injury (4, p. 433). The experiments of Laidlaw, who took at one time 60 gr. in four days, and at another 70 gr. in divided doses in eight days (Obs. xiv), and those of Spence, who took a less quantity, show that these doses are sufficient to produce very marked disturbance of the nervous system.

Acute Poisoning.

27. The action of lead in large doses is ranked by Christison under "irritant poisoning," while Tardieu places it under "poisons stupéfiants." If a soluble salt of lead is taken along with solid food, a short period may occasionally elapse before its action is manifest. A girl swallowed about 3 drachms of the acetate of lead in broth. It was not till two hours afterwards that she began to experience colic, followed by vomiting (4, p. 432). If swallowed in a liquid form in a sufficient dose, a sweetish taste is perceived, with sometimes a sense of burning extending to the stomach; very soon nausea comes on, followed in ten to thirty minutes by vomiting; then acute pains are felt in the stomach and bowels, sometimes attended with diarrhœa, sometimes with constipation, the abdomen being retracted, at other times distended. Often the gums are swollen, the breath offensive; the tongue slightly swollen, generally whitish, and covered with small prominent white points. Sometimes the blue line, so characteristic in chronic poisoning, is seen. Occasionally the patient has been observed to suffer from cramp in the calves of the legs, pain in the insides of the thighs, pains all over the body, and numbness (Obs. i).

There is general prostration, the face is pale, the lips livid, the voice weak, or there may be complete aphonia; hiccough supervenes, syncope and convulsions precede a comatose condition, which may last two or three hours before death occurs.

28. If the symptoms stop short at the stage of depression, then, after some disturbance of the nervous system, violent fever sets in, with continuance of the agonising epigastric pain. These symptoms slowly pass away, leaving great weakness, obstinate dyspepsia, and not unfrequently mental distress.

In Obs. ii the symptoms during life gave rise to the certificate of death from *ordinary nephritis and abscess*; the official examination showed poisoning from lead.

In Obs. iii the death certificate was *delirium tremens*; the official examination proved that the severe cerebral disturbance was due to lead-poisoning.

29. *Morbid anatomy.*—The opportunities for autopsies have been few, and these have yielded no very characteristic appearances.

30. *Digestive organs.*—A slight superficial inflammation of stomach has rarely been found. The mucous membrane is thickened, greyish, softened; sometimes there is erosion, but this is due to chemical action. This corrosive action belongs to the neutral salt in large doses; it never

occurs when the dose is small or when it is combined with an acid (4, p. 433). Though so much of the distress is attributed to the œsophagus, it is found healthy.

Sometimes the stomach and intestines present ecchymotic patches, sometimes merely vascular ramifications on the surface of the mucous membrane, much more rarely under the peritoneum.

31. *Kidneys.*—Nothing abnormal has been noticed, whereas in chronic poisoning the kidney lesions are common. Probably if a post-mortem examination had been made in Obs. ii, marked lesions might have been seen, for the symptoms during life gave rise to the diagnosis of ordinary nephritis dependent on calculus.

32. *Brain.*—In cases where cerebral disturbance has been marked and prolonged, the lesions attending encephalopathy from chronic poisoning are present. There is increase in the volume and density of the cerebral substance; the convolutions of which are flattened, and present a uniform yellowish colour (8, p. 839, also Obs. iii).

Chronic Poisoning.

33. The various preparations of lead are slowly absorbed into the system, principally through the digestive organs, in a lesser degree by the respiratory mucous tracts, and by the skin. Cases also are on record where chronic poisoning has ensued from the use of vaginal injections, containing salts of lead. The quantity of lead necessary to produce its chronic specific effects differs much according to the mode in which it is introduced and the variety of constitution. At Claremont thirteen persons were poisoned in the course of seven months by using water which contained 1 grain of lead to the gallon. Herapath, of Bristol, states that water, containing no more than 1,500,000th part of lead, that is 1 grain in 7 gallons, cannot be drunk with impunity, and he mentions cases when this quantity set up chronic poisoning (*Br. For. Med.-Chir. Rev.*, 1851, 87).

34. The lead being absorbed mingles with the blood, and through this channel affects the whole system, acting on every organ, but in an unequal degree.

When absorbed it appears to lodge in various parts of the body, entering probably into combination with albumen; it is very slowly eliminated. In this state it will sometimes remain long inactive, until some cause, such as increased exposure to lead influences, cold, intemperance, the use of some remedies (pot. iod.), sets it free, when acute symptoms arise in addition to the chronic; the most common of these is colic.

Colic is far from being generally a primary symptom, for workers in lead may for some months suffer from marked anæmia, cachexia, and paralysis without manifesting colic until exposed to some of the above causes.

35. The signs of primary blood-poisoning are discoloration of the teeth and gums; blue line on the dental edge of the gum, sweetish taste and fœtid breath; dirty yellow tint of the skin most marked

upon the face; the countenance has a dull, anxious, gloomy expression; general emaciation, especially of the face; pulse small and wiry. The most frequent and promptly produced symptoms are discoloration of the teeth and bluish tint of the gums; next in frequency comes the sweetish taste, the fœtid breath, the emaciation, and alterations of the blood and circulating organs. The order in which these symptoms arise is the same as that of their frequency. These primary symptoms may exist for days, weeks, or even for years, before the development of any other affection, and an individual may bear traces of them during his lifetime without any further disease being produced.

36. After this primary train of symptoms, the action of lead is shown upon various portions of the nervous system by the production of colic, arthralgia or myalgia, paralysis, and an affection of the brain, which has been styled encephalopathy. Of these the colic is the most frequent.

37. Their relative frequency will be shown by the following table, drawn up by Tanquerel des Planches:

Colic	1·217 cases.
Arthralgia	0·275 „
Paralysis	0·127 „
Encephalopathy	0·072 „

38. Of these four affections, three are acute, while the paralysis is generally more chronic in its course. Out of a hundred individuals placed in apparently the same circumstances and exposed to the action of lead, one will be affected with colic, another with arthralgia, a third with paralysis, and a fourth with encephalopathy, or with a combination of all these conditions.

39. The whole organism languishes, necessary assimilative changes are arrested or retarded, digestion fails, albumen appears, often attended by organic disease of the kidney, the heart is diseased, the brain loses power, and life is dragged on under all the depressing influences of anæmic cachexia.

The tongue becomes white and furred; the breath is fœtid, a sweetish taste in the mouth, or clammy and bitter. Anorexia is more or less complete. Constipation, often nausea, more rarely vomiting of mucus in the morning; with these symptoms there is a peculiar look of suffering in the face, with staring eyes, and often a sense of numbness or of pain is felt in the extremities.

Dull abdominal pains, extending from epigastrium towards the back and extremities, set in, and gradually lead on to colic; or this may come on suddenly, generally preceded by an increase of dyspepsia. This dyspepsia is a chronic gastric catarrh, and is most marked in those suffering from confirmed anæmia.

40. *Blood.*—The blood soon feels the effects of lead; its action in diminishing the number of red corpuscles was pointed out by Andral and Gavarret; thus the signs of marked anæmia present themselves, and constitute the principal characters in lead cachexia.

The red corpuscles are diminished in number sometimes to one half the normal amount, and they become larger and less elastic;

but, though individually increased in size, their surface and volume in a cubic millimètre of blood is inferior to the volume of normal corpuscles. The watery constituents are not diminished; there is no hydræmia (*Mellasiez*, 9, p. 28).

41. *Circulating organs.*—Dr. Carson observed that house painters and others, with either paralysis or great muscular debility from lead-poisoning, had uniformly a more or less weakened impulse of the heart, and generally, on going upstairs, complained of some faintness and cardiac distress. These heart symptoms were absent in the earlier stage when lead colic only existed. He gives ten well-marked cases where the poisoning had produced paralysis of the extremities, and where much alarm was excited by the great feebleness of the heart, with palpitation, consequent fainting, weak and soft pulse. He regards its cardiac action as similar to digitalis, oil of tobacco, upas antiar, woorara, tending specially to paralysis of that organ (21).

42. Tanquerel states that he has never heard even once blowing sounds or the bruit de diable in the large arteries and heart, unless they attended diseases of the heart, independent of lead action, but existing in lead workers (7, i, p. 19). More recent observers report many cases where there was marked modification of the cardiac sounds, and occurring in lead workers who were temperate and apparently free from gout and syphilis.

43. According to Durosiez (11) the cardiac sounds are at first purely chlorotic, then after a time in a certain number of cases the sounds are reduplicate, becoming rough and blowing. As cure takes place this course is reversed, the rough murmurs disappear, and become chlorotic, and these in time may cease. He has noticed that the femoral artery is sometimes the seat of a double intermitting bellows sound. This was noticeable in the case of a house-painter, aged 21, who had for seven years been in contact with lead; there was slight hypertrophy, the sounds reduplicate, the second sound was rough and altered, almost like pericardial friction sounds.

Addison reports a case under his care in Guy's Hospital, of a pale exsanguined man, who had long suffered from heart symptoms, chiefly palpitation, and failing power of the limbs. At first this patient was supposed to be suffering from cerebral mischief consequent on cardiac disease, but a later examination of the case showed the symptoms to be due to lead impregnation (*Med. Gaz.*, ii, 1856, p. 643).

Durosiez, judging by the cases he has collected, considers the stethoscopic examination most generally indicates disease of the aortic valves.

44. Tanquerel has never found hypertrophy, and Naunyn makes the same statement (12, p. 586). In addition to the evidence of Beau and Durosiez that concentric hypertrophy exists, reference may be made to Obs. vii, reported very carefully by Lancereaux. In this case, of a house-painter, aged 43, who had suffered from colic, there was paralysis of the extensors, several attacks like gout, and albuminuria; the autopsy revealed hypertrophy of ventricle, atheromatous degeneration of aorta and other arteries, insufficiency of aortic valves, granular degeneration of kidneys, uræmic gastritis; uratic inflammation

of various joints. In analysing this case, Lancereaux attributes the alterations of kidneys and aorta to the lead; the condition of heart to the state of kidneys and aorta. This is probably the history of all the reported cases of hypertrophy. The more difficult question to decide is whether the atheroma affecting the valve and the aorta is the specific action of lead, or whether other factors, such as gout and alcohol, combine to produce the alteration. Their presence may explain some of these cases, but it is doubtful if their influence is evident in all. This question will be again considered under the gouty pathogenesis of lead.

45. The sphygmograph indicates *tricrotic*, even *polycrotic pulsation*. This tricrotism is due, according to Marey, to abnormal ventricular systole, and he views it as characteristic of the action of lead on the heart.

46. Lead excites various pains and uneasiness in the cardiac region. Tanquerel relates, for instance, a case where there was violent acute pain mounting from the epigastrium into the chest, extending along the inner surface of the arms; the patient was a prey to the keenest agitation and cruel anxiety; he sits in bed suffering from violent palpitation of the heart, and sensations of suffocation which even advances to syncope.

Tanquerel, Desbois de Rochefort, Andral and Ollivier have noticed violent pains resembling *angina pectoris* (7, i, 226).

Pulse.

47. In persons exposed to lead influences the pulse is small, thready, soft, and easily compressed. Tanquerel has noticed, but very rarely, and independent of the presence of colic, that in workmen whose pulse previous to becoming lead workers was 60 to 70, it fell afterwards to 40, 45, 55.

The pulse is never intermittent or quick, except sometimes towards the fatal termination of cerebral disease. With the attacks of colic there is generally a peculiar hardness and vibration of the pulse with marked diminution of frequency, sometimes falling to 40. This is probably a reflex phenomenon, caused by irritation of the sensory fibres of the splanchnic nerve.

Tanquerel states that during the attacks of colic the pulse is sometimes, but very rarely, soft and quick for a second, then slow; he noticed it undulating in six cases, and dicrotic in twenty-two (i, p. 228).

Small Vessels and Capillaries.

48. Lead is supposed by some writers (Rosenstein, Hitzig, Gubler) to cause contraction of the muscles of the arterioles. Hitzig not only maintains this, but that the influence extends to the veins. He instances the superficial veins of the back of the hands and forearm as presenting, especially at their points of junction, marked zones of contraction, like strings of beads, becoming more marked on movement

of the parts, without any induration, and differing from a varicose condition (9, p. 33). The experiments of Heubel throw great doubt over the power of lead to contract the unstriped muscles of the arterioles.

Respiratory Organs.

49. Lead is readily absorbed by the respiratory surfaces, and workmen much exposed to the dust of lead occasionally suffer from bronchitis. This is probably a local action, and not a specific effect of lead. The specific effect is seen in its action on the nerves supplying the intercostals and larynx, and probably in its power to excite asthma, with more or less bronchial catarrh.

50. The difficulty of respiration which sometimes accompanies colic, and described by older writers as metallic asthma, is attributed by Tanquerel to *paralysis of the intercostals*, and according to him is a very rare affection. A patient affected by lead paralysis or colic without any previous pulmonary disturbance suddenly feels a great difficulty in raising the ribs; they seem almost immoveable. When urged to move them the clavicles are raised and the parietes of the chest follow, but like a fixed mass, without action of the intercostal muscles, the action of the diaphragm is increased, the respiration becomes more and more laboured, mucous râles are heard, no expectoration, and gradually the patient dies from asphyxia (7, ii, 61).

51. With this condition there is sometimes aphonia. This aphonia Tanquerel attributes to paralysis of the laryngeal muscles; and it is a question how far this condition of the larynx contributes to the extreme dyspnœa occurring among lead-workers, and is independent of the intercostal paralysis.

Grünther, Gurlt and Hertwig have found in horses who have been employed in lead-works, that the recurrent nerve and its terminal ramifications were atrophied, and the dilator muscles of the glottis affected by fatty degeneration (9, p. 49).

52. Renaut quotes Lewy as having (1811) contributed some remarks on lead asthma, which is a rare affection, as he met with only 21 cases out of 1186 saturnine poisonings.

He divides the cases into acute and chronic.

53. The acute form is seen in those constantly exposed to the dust of lead, especially white lead; it is characterised by extreme dyspnœa, attended with great anxiety and restlessness, deep inspiration, accompanied by epigastric pains and palpitations. The cough is painful and convulsive; percussion normal; the face pale, and covered with cold sweat; no expectoration.

There are frequent intervals of ten or fifteen minutes between the short attacks. It is generally accompanied by discharge of nasal mucus, which always contains lead. The attack lasts at least eight to twelve hours, but may be prolonged to as many days. It resembles very much hay asthma.

54. The chronic form is seen in very confirmed old cachectic cases. It is characterised by dry cough in violent long intermittent paroxysms which wholly prevent sleep. The cough is often attended with dyspnœa

which at last becomes severe, complicated with chronic bronchitis and œdema of the lungs. The autopsy reveals cirrhosis of the lungs, and the presence of lead in the pulmonary tissue (9, p. 50).

The chronic form is generally attended by cold creeping sensation of the skin and great shivering; no perspiration can be excited.

Skin.

55. When lead-poisoning is confirmed the skin assumes a dirty pale yellow colour, which is due to anæmia; it has the characteristic of being fixed, and not affected by any emotion. This colour has been described as that of jaundice, but no bile is present in the blood or in the urine. Tanquerel, who designated it as *icterus saturninus*, states that this colour has nothing to do with the biliary pigment. He has observed it disappear for a time during severe attacks of colic. There is also, sometimes, in confirmed cases a more decided yellow colour more akin to jaundice. This discoloration affects the sclerotic and stains the internal organs, intestines, brain, &c. This is not a true hepatic icterus, for no bile is present in the urine. The discoloration is due to the breaking up of the colouring matter in the blood, such as is present after the effects of ether, chloroform, and phosphorus. It is a hæmatogenous icterus; it is the choleic icterus of Frerichs, the *ictère hémapheique* of Gubler.

56. *Absorption and elimination by the skin.*—Opinions have differed as to the absorption of lead by the skin; there can be no doubt that, under certain circumstances, some portions of the skin, *e.g.* hands and feet, do permit of the absorption of lead (*Manouvriez, Obs.* 9, p. 21).

Grisolle and Rabuteau consider that lead is eliminated by the skin (5, p. 16). Its presence is indicated by the appearance of black spots or points after the lead patient has taken a sulphur bath. This condition is sometimes a very persistent one. Moreau quotes an instance where it was demonstrable six years after the patient had entirely ceased to work in lead (*Gaz. des Hôpitaux*, 6 Juin, 1871). That these dark spots are not always due to the presence of lead, lodged from without on the skin, is shown from their appearance after acute poisoning. A woman, æt. 22, was admitted into La Charité, Paris, on the 23rd July, having a few hours before swallowed a quantity of acetate of lead in solution. On the 3rd of August, after using a sulphur bath, black spots were observed on the thighs, abdomen, and various other parts, especially between the fingers and toes. A young woman took a solution of acetate of lead by mistake for an emetic; she suffered acutely in the throat and bowels for three weeks. After each sulphur bath, which she took during this time, all the skin became blackish (Rabuteau, *Eléments de Toxicologie*, p. 625).

Blue Line on Gums.

57. This diagnostic sign is most strongly marked upon the upper jaw, it has often a dark edging due to the deposition of particles of sul-

phide of lead arising from the action of sulphuretted hydrogen. It appears in all the stages of lead-poisoning, but disappears in confirmed anæmic cachexia, when the subject of it has been long removed from lead influences. Taylor says he knows of no facts to enable us to state within how short a period in an acute case the blue line may appear (p. 441).

Burton, of St. Thomas's Hospital, who first drew attention to this diagnostic line, has seen it appear after twenty-four hours, and he thinks after strong doses it may be seen after four to six hours.

Moreau relates a case of attempted suicide treated in La Charité, Paris, when the line was noticed about twelve hours after the Extrait de Saturne had been swallowed (10, p. 85). That this line is not always due to the local action of lead is shown in a case reported by Schonbrod, where, in a case of poisoning due to using vinegar kept in a glazed vessel, violent colic supervened, but no blue line was seen until four weeks after the patient had ceased to use the vinegar (9, p. 37).

Hilton Fagge thinks the blue line is due to sulphuretted hydrogen diffusing itself into the texture of the gums and then combining with the lead circulating in the blood or contained in the plasma which is for the nourishment of the texture. He states that the administration of iod. pot. sometimes brings out the line when it had before been absent (*Med. Tim.* i, 1876, 592).

Dowse noticed that in women, who suffered soon and much from cachexia owing to their exposure to fumes in white lead works, the blue line was often absent (*Med. Tim.* i, 1876, 357).

58. In addition to this blue line Gubler draws attention to the dark-coloured spots seen sometimes on the mucous membrane of lips and cheeks, which, from their resemblance, he has called *tattooing* (9, p. 38). These fine dotted spots have been examined by Gréhant, and the discoloration is due to sulphuret of lead (8, p. 834).

Colic.

59. Colic is a very characteristic symptom of chronic lead-poisoning; it is always attended by anorexia, which disappears or is lessened when the former ceases. The pains are dull and continuous, or more frequently in paroxysms, and intensely acute, causing the patient to toss about in bed and groan, or else leave the bed in despair, and do the most foolish things. The pains dart in the direction of the loins, of the thighs, and down the course of the spermatic cord, to the penis and testicles. The pain is remitting, varied with intervals of comparative ease, but even then there is generally a continued griping, and dull cramp-like pain; pressure never increases the pain, but almost always gives relief, affording a characteristic feature of this colic. The abdomen is as hard as a board and the retraction is often so great that the form of the bodies of the vertebræ can be seen through the skin. There is almost always complete constipation, lasting even eight to fourteen days in spite of powerful drastic purgatives. It is very rare that diarrhœa takes the place of constipation, and its occurrence is more

frequent when this colic follows acute poisoning; under these circumstances there is distension instead of retraction of the abdomen. Constipation, retraction and relief from pressure are very characteristic. Generally the pains are more severe in the evening and at night.

60. There is almost invariably an absence of pyrexia, and the pulse falls in a remarkable manner, often to 50 and even 30 beats (7, i, p. 573); it is variable in frequency, full and hard, but not intermitting, often tricrotic. Renaut reports a very carefully observed case where the temperature rose to 102°, and the pulse to 124 (p. 43). The early attacks subside in from a few days to weeks, and after repeated attacks the duration may extend to months. The relief is sometimes gradual, sometimes sudden, and is quickly followed by cessation of the anorexia and constipation, with a return of the pulse to its normal standard.

61. The prognosis is favourable; according to Tanquerel the mortality is 2 per cent.

62. *Constipation* independent of colic is a common feature in workers in lead.

Liver.

63. During the duration of the colic retraction of this organ has been described by some writers. According to Potain this retraction gradually disappears, but in some cases where cachexia is established the liver remains permanently contracted (9, p. 47).

Little is yet known as to the influence of lead on the biliary secretions.

Though lead is found in the liver in quantities next in proportion to those in the kidneys, its presence in the biliary secretion is only appreciable.

The insufficient action of the liver may be deduced from the presence of uric acid in the blood, and the hemapheic condition of the urine (*vide* Urine).

Morbid Anatomy.

64. Post-mortem appearances in the digestive organs after chronic lead-poisoning are not characteristic.

According to Kussmaul and Mayer the gastro-intestinal membrane gives evidence of chronic catarrh. The gastric glands are sometimes atrophied or the seat of fatty degeneration (?). The same lesion with atrophy of the mucous membrane extends to the small intestines and upper part of colon. Peyer's glands are affected by fatty degeneration. The cellular coats of the stomach and intestines are much thickened. The muscular fibres of the intestines show fatty degeneration in a number of points; more or less limited or widespread contraction of the intestines.

65. Tanquerel and Segond drew attention to the condition of the sympathetic ganglions. Kussmaul and Mayer confirm this by describing a proliferation and sclerosis of the connective tissue of several of the sympathetic ganglions, principally in the solar plexus. They are

indurated; the calibre of their vessels is diminished, as also the amount of nervous cellular elements (R., p. 40).

Arthralgia.

66. Next in frequency to colic, arthralgia is the most common symptom in lead disease. After prodromata analogous to those of colic, or without them, appear more or less suddenly tearing, boring, and burning pains in the joints or muscles; sometimes it is described as pins and needles. These pains do not run in the direct course of any nerve; they sometimes are superficial as if in the skin, at other times deep seated as if in the bones or mass of the muscles; sometimes the pain is in the centre of the joints, sometimes they are quite free, and the pain is in the muscles, presenting more of myalgia than arthralgia.

The pains are worst at night; they have remissions and exacerbations, and they are diminished by pressure. There is no heat, no redness, no swelling attending the pain, no pyrexia, so that this arthralgia cannot be mistaken for acute articular rheumatism: it never deforms the joints. Constipation, so attendant on colic, is here absent.

They are often accompanied by intense cramp, producing tetanic rigidity of the muscles.

The lower limbs are much more frequently affected than the upper; according to Tanquerel, out of 755 cases, 485 affected the lower extremities, 88 the upper, only 3 the head, and 9 the trunk, 18 the loins, 118 the upper and lower limbs, 35 limbs and trunk, and 9 the extremities, trunk, and head.

Tanquerel says the only difference between the colic and the arthralgia is their seat; they are both characterised by cramp-like action. The pains generally cease suddenly after many variations and remissions, leaving no effects except a tendency to relapse.

Paralysis.

67. After arthralgia, the most frequent symptom is paralysis. In the majority of cases it is not primary, but appears generally after several attacks, most frequently of colic, then of arthralgia or encephalopathy.

Tanquerel, who has given a very elaborate account, shows "that paralysis may occur as early as on the third day after the first exposure to lead; further, that in 102 cases, 9 occurred in the course of the first month, and 14 in the course of the first two months, that 34 developed in the course of the first two years, though often this symptom did not appear until much later;—thus 48 cases occurred aften ten years, and some even after fourteen and twenty years. Even after fifty-two years of exposure to lead without any serious detriment lead paralysis has been observed" (7).

68. The attacks are generally progressive, slow, and partial, rarely general and complete. They are generally preceded by sense of pain and dulness in the affected limbs, sometimes the onset is sudden. They have the peculiar character of attacking the extensor muscles, of

affecting the upper extremities very much more than any other part of the body, presenting in this respect the reverse tendencies to arthralgia.

69. The vocal organs are also sometimes affected; this affection is frequently noticed in horses working in lead mills, rendering tracheotomy necessary.

The muscles of the face or eye, with the exception of the lips, are never affected.

Paralysis of the extensors of the hand and fingers, especially the extensor communis, with freedom of the supinator, is the characteristic form; next the triceps and deltoid are most generally affected. The characteristic form is what is called by painters *drop wrist*. Here the power to flex the wrist and grasp with the fingers is very feeble, and the power to extend the wrist or fingers is lost. When the arm is stretched out from the trunk, the hand hangs, as if lifeless, from its articulation at the wrist (*vide* Obs. xv).

When the lower extremities are attacked, the paralysis is seen on the exterior of the foot on the peroneal side, and in the muscles of the toes.

70. In the majority of cases the paralysis affects the extremities of both sides, and often the same muscles in both extremities.

Stoll and Andral have observed a hemiplegic form, in as far as there was paralysis of certain muscles in the arms and legs of the same side.

Raymond and Vulpian have described cases where the hemiplegia resembled that from ordinary cerebral causes (9, p. 151, 166, 174; *vide* Obs. x).

71. Duchenne has shown that the electric mobility is very rapidly lost in saturnine paralysis; according to further researches of Vulpian and Raymond the loss of electric contractility precedes that of voluntary contractility. When the electro-muscular contractility has ceased there is no longer any electric sensibility (9, 76).

The muscles which have lost their electric contractility are the most atrophied and altered in lead paralysis. As long as this property exists recovery may take place; after it ceases the prognosis is more unfavourable. This atrophy of the affected muscles is often very rapid, resembling in this respect the shrinking in progressive muscular atrophy, and it is the more marked from the unchanged condition of the neighbouring healthy muscles.

72. The paralysis may disappear gradually in a few days or weeks; it may become stationary, and last for years. The paralysis may be accompanied by anæsthesia and analgesia, but these symptoms will be considered under the head of encephalopathy, with which they are more frequently allied than with palsy.

73. Long-standing paralysis leads to various deformities, due to loss of antagonism in the muscles. An occasional attendant on paralysis is the appearance of a "tumour on the back of the hand." This swelling was first noticed by De Haen and by Tanquerel; it was attributed by them to the projections of the bones. It has recently been investigated by Gubler, Nicaise, and Huc-Mazelet. The first writer describes it as appearing on the dorsal aspect of the hands of all persons affected by paralysis of the extensors; so that it is not a symptom confined to lead

palsy. It is marked by an indolent swelling, rarely attended by redness, giving to the touch the feeling of thickening of the extensor tendons; its size may vary several times in the course of the same day. It appears to be a kind of chronic synovitis with tendency to thickening. It appears soon after the paralysis and it disappears as the muscular power returns. A few weeks after it has disappeared, there is not a trace of abnormal appearance in the synovial bursæ. With these tumours there is often local anæsthesia (9, p. 91).

Trembling.

74. Connected with palsies, but without any marked loss of power, trembling is observed at the commencement and disappearance of the paralysis. It may also affect freely-acting muscles; it is frequently observed in the face, which is never affected with lead paralysis.

According to Lafont it is generally preceded by progressive weakness of the limbs; it commences frequently with the arms, remains localised, one-sided, especially the right side; affecting the hands first, very seldom the head; it rarely becomes general.

It is increased by fatigue, it appears principally and with greatest intensity towards the end of the day, distinguishing it from alcoholic trembling which is worse in the morning. It is a symptom independent of paralysis, and its existence in no way affects the electro-muscular contractility (9, p. 87).

75. *Morbid anatomy.*—The knowledge on this subject is imperfect. Such authors as Charcot, Gombant, Westphal, Vulpian and Raymond, though in accord as to the condition of the muscular tissue, have different views as to the nervous lesions.

Kussmaul and Mayer first noticed a peculiar rigidity of the muscles. This has been confirmed by the observations of Gombant, who describes these different conditions in the muscles of those dying from lead paralysis and cachexia:—1st, Muscles pliant and healthy; 2nd, of a yellow colour and atrophied; 3rd, some like smoked flesh, so hard and rigid that a long muscle, detached from its insertions, could be held horizontally without bending (9, p. 78).

True fatty degeneration has very rarely been seen. Ollivier and Lancereaux have observed granular degeneration, consisting partly in simple atrophy, the muscle preserving its structure but showing diminution of contractile substance. The adipose vesicles increase between the primitive muscular fasciculi, which then become yellow and pale. Side by side with these changes, and succeeding them, the nuclei on the internal face of the sarcolemma are multiplied, pushing back the contractile substance, forming accumulations at various points, giving the muscular fibre a mossiliform appearance (9, p. 79).

76. The examination of the cerebral nervous system has given no results. Raymond and Vulpian found in one case that the cervical portion of the spinal cord was altered. The anterior roots, as also the muscular nerves, were normal, the anterior horn of the cord presented on its external aspect various atrophied cellules, shrunken, deprived of nuclei, and everywhere pierced with small vacuoles.

Lancereaux has pointed out a granular adipose degeneration of the myeline, and the spinal cord showed a little atrophy in the centre of the anterior roots; there was no lesion of the horns of the grey substance (Obs. vii). Gambault has been unable to find any changes in the medulla.

Déjérene, from a careful examination of five cases, confirms the description above given of the intramuscular nerves and radial nerve. In two cases he found alterations in the anterior cord. In two cases he was able to trace distinctly the degeneration of a certain number of the nervous tubuli similar to that met with in the intramuscular nerves. In one of these cases where the patient was only paralysed on one side, the roots had degenerated on the corresponding side, the other being perfectly healthy. In the three other cases no distinct change could be found (*Lond. Med. Rec.*, 1879, p. 112).

76. *Various theories have been given as to the action of lead.*—Some attribute the palsy to peripheral action, and Charcot places this paralysis in the same class as that due to cold, as the electric changes are the same in both. Westphal considers it an affection of the nerve; he bases this principally on a case where he saw an abundant new formation of nerve-fibres in the radial nerve, which he considered the sequence of previous degeneration (12, p. 579). Renaut throws doubt on the appearance of what Westphal considered new fibres (9, p. 80). But even this observation of Westphal does not prove that the palsy is due to peripheral and not central causes, for according to Erb this reaction is not unfrequent in palsy having a cerebral origin (12, p. 588). The rapid atrophy of muscles has also been observed in diseases which have a central, and especially a spinal origin.

The direct action of lead on the muscular fibre is based on Gusserow's experiments where he found a larger amount of lead in them than in other tissues. The later and further experiments of Heubel on animals demonstrate that the muscular system contains the least quantity of lead. These experiments of Heubel show that the affinity of lead for the intestines and muscles is due to the direct deposition of lead. Beyond this there are not sufficient data to decide whether the paralysis is local or central.

The largest quantity he found in the bones (the destructive process necessary for the chemical examination of the tissues diminishes the actual relative proportion in bones as compared with moist tissues), then in the kidneys, next in the liver, after this comes the spine and then the brain, and last of all the muscles. These experiments, so far, show that the affinity of lead for the intestines is not due to the direct deposition of lead. Erb thinks the origin of lead paralysis is probably spinal instead of peripheral. Déjérene (loc. cit.), from his post-mortem examinations, considers that the paralysis unquestionably originates from the spinal cord. Remak, after a very accurate and detailed examination, comes to the conclusion, that quite circumscribed alterations in the anterior horns of the cord probably lie at the foundation of lead paralysis, which in all its relations is analogous to poliomyelitis anterior chronica (*Ziemssen's Cyclop.*, xiii, p. 716).

Encephalopathy.

77. Lead-poisoning presents its most serious aspect when it develops its action on the brain. This class of disease was first described by Grisolle in 1836 (*Journ. Hebdomadaire*, 1836) under the name of Encephalopathy; previous to this date it had been unnoticed or as by Mérat in 1812 considered to be independent of lead. Three years after this Tanquerel wrote on the same disease, and copied Grisolle's words and terms without any acknowledgment. The latter distinguishes four forms (5, p. 127), and the former exactly follows him. One is marked by delirium, a second by coma, a third by convulsion, and a fourth by a complication of all the three. It occurs among those workers in lead who are very freely exposed to its absorption, and very soon manifests its presence. In the 72 cases collected by Tanquerel, it was developed in 1 in eight days; in 10 in the course of the first month; and in 44 in the course of the first nine months; on the other hand, in only 28 cases was it developed in from one to fifty-two years after the individuals had begun to work in lead (7, ii, 272).

In animals exposed to the influence of lead it is very frequent, and in dogs, after experimental poisoning, it is almost always the symptom which last appears.

It may occur even ten months after all employment in lead has been abandoned. It may develop primarily before any colic, paralysis, or arthralgia; this occurred in 6 out of 72 of Tanquerel's cases; generally it appears suddenly in the course of lead-poisoning. The attack may come on suddenly, usually there are prodromata.

78. The premonitory symptoms are generally broken sleep, then complete insomnia, at the same time severe headache, occipital or frontal, with or without vertigo; noise in the ears, disordered vision, diplopia, amaurosis, modified condition of the pupil; difficulty in swallowing owing to sense of contraction of pharynx, though liquids are swallowed greedily and in gulps. Sometimes there is sudden loss of sight and hearing. The mind is weakened, the patient becomes morose, dejected, and indifferent to everything, weeping from sadness. The attacks are often preceded by the urine becoming albuminous and presenting a dark-red sediment, this appearance Renaut considers very diagnostic; it is independent of chronic nephritis and precedes the convulsive form. After eclampsia the appearance of albuminuria is common.

Throughout the whole course of the disease the pulse remains unaffected, except under severe convulsions and towards a fatal termination. Wilson, in his description of this disease as affecting the miners at the Lead Hills, notes, during the delirium, a marked irregularity of the pulse, occurring every third or fourth beat.

79. *Delirious form.*—According to Grisolle, one quarter of the individuals who suffer from cerebral attacks from lead, have delirium; of these in one third it is shown in hallucinations, and no agitation; in two thirds there is violent delirium. The quiet form may, however, suddenly change into the furious.

The symptoms of aberration are attended with trembling of the

limbs, rapid abrupt incoherent speech, or constant muttering; they are separated by lucid moments; gradually these intervals diminish, and general delirium sets in. Whenever the delirium is completely developed, it proceeds with remarkable irregularity; it is aggravated, it diminishes from one moment to another without any order, sometimes attended by regular remissions. When the delirium is violent, and lasting long, the patient speaking constantly, the mouth becomes dry, the tongue dry, furred, cracked, and trembling. The pulse is then quickened and irregular; the whole condition resembling that of a nervous fever. In this violent delirium there are sometimes breaks, when the patient gives reasonable answers to some questions; resembling according to Grisolle *la folie raisonnante*. Sometimes there is no manifestation of fury; Tanquerel noticed this in seven cases. For instance, one patient is under the impression he hears delicious music which charms him. Another insists a woman comes sometimes in front of him, sometimes behind his bed, saying the most biting things to him, and this goes on from day to day; he narrates this with perfect calmness, and he believes in its reality (7, ii, 388).

80. *Epileptic form.*—The attacks of eclampsia may be preceded by the same prodromata as in the delirious form, sometimes they come on suddenly.

According to Grisolle and Tanquerel they are never preceded by aura, sometimes by slight vertigo; in about 1 in 36 cases there is the initial shrill cry. The extreme rigidity is very characteristic, it is sometimes tetanic, and is almost always confined to one side, affecting principally the upper extremity, and sadly disfiguring the face. The eyelids are closed or quite open; the eyes are fixed or rolling; the muscles agitated by convulsive twitchings. In one half of Grisolle's cases the tongue was fixed between the teeth and torn; the lips covered with frothy saliva, rarely bloody. The face is of a purple colour and the veins of the neck swollen. The respiration is short and difficult, becoming noisy and stertorous. The attack does not at once reach its greatest intensity, gradually the convulsions and the subsequent coma become more severe and prolonged; sometimes delirium takes the place of the coma.

The case may last for several days; when the attacks are frequent death rapidly ensues; in the mildest forms, during the intervals the consciousness becomes gradually more pronounced, or it may at once return as after ordinary epilepsy. In one half of Grisolle's cases sensation returned gradually in four to six minutes, the intelligence remaining dull and the words incoherent. Others in waking up became maniacal, others were tormented by sad thoughts or frightful visions. Those who recovered had afterwards generally good health; one fifth had consecutive paralysis or amaurosis, these may disappear or last a lifetime.

81. *Catalepsy.*—Tanquerel describes two cases where the attacks assumed a cataleptic form. This was perfect, lasting from a quarter of an hour to an hour, then alternating with a lethargic condition and at last ending in violent delirium.

82. *Comatose* variety was noticed by Tanquerel in six of his patients, one type coming on suddenly, preceded sometimes by amaurosis; more

rarely it appears in the course of colic or arthralgia; most generally the sequence of epilepsy.

Grisolle confines the term comatose to those cases where it is primitive, and not consecutive to epilepsy or delirium.

The patient lies motionless, giving an occasional snore or grunt: by pinching he may with great difficulty be roused for a short time: speaking loud has no effect; the pupils are dilated, sometimes, but rarely contracted, immoveable in either condition or exposure to bright light. Sensibility and mobility are much diminished

In another type, after profound sleep the patient suddenly awakes, looks wildly round him, he mutters unintelligible sounds. On strongly exciting his attention he may look steadily without speaking or answer in one or two unsuitable words. For instance, one said always "Pater noster;" another, "Pater noster, terer, noster terer, terer," and so on, the words always ending in er.

83. *The mixed form*, where delirium, coma, and convulsions occur together, is the most common type of encephalopathy. They occur in various combinations and successions, appearing and disappearing quickly. In general a very slight delirium may last some hours or even two days, then an attack of epilepsy lasting some minutes, from this the patient wakens confused and keeps muttering for hours; then follow more severe and frequent attacks of epilepsy, with increasing coma in the intervals, when this is prolonged death ensues. When the attacks of convulsions are less frequent, the patient will often suddenly recover, feeling bruised and intensely desiring sleep.

The more the disease is protracted, so do the paroxysms become more violent.

84. *Prognosis.*—In all these forms the prognosis is unfavourable, especially in the epileptic type, when more than one half die. The course of all is irregular and insidious. When recovery takes place the return of health is sudden, rarely gradual. If the delirium be intermitting, then it may last four, six, nine, seventeen days without death occurring (Grisolle). The epileptic attacks may be repeated from ten minutes to seven days. The comatose variety generally continues from two to ten days. Sometimes, but rarely, the duration is so short that in a few hours, even minutes, death occurs.

85. *Morbid anatomy.*—Tanquerel gives no definite results. Grisolle found in one half of his autopsies no morbid appearances; in the other half, especially when there had been epileptic or epileptiform attacks, the convolutions were flattened, so pressed the one towards the other that the surfaces seemed continuous.

The cerebral pulp sometimes presents a yellowish colour, it is hardly ever injected, generally anæmic. The consistence is normal, sometimes increased, rarely diminished. In the latter case the brain sticks to the finger, giving the sensation of handling "pâté de guimauve." No serum in the ventricles (5, p. 26).

The anæmic condition of the grey matter has been noted by several observers (9, p. 85). Andral found the characteristic appearances of so-called hypertrophy of the brain in two cases of workers in white lead; they were ill twenty-four hours, and died with eclampsia.

Meriodec, Laennec, Bright mention similar instances (*Hitzig in Ziemssen's Cycl.*, xii, p. 826).

Anæsthesia.

86. The disturbances of general sensibility are more of a chronic character, and the most characteristic is anæsthesia.

It is not very common, for Tanquerel in his own experience only met with it in eleven cases. It has also been described by Beau, by Gubler, and Renaut, who draws his observations from cases treated by Raymond and Vulpian (9, p. 63).

It is generally confined to the skin, rarely affecting the deeper tissues; it appears with, but more generally follows motor paralysis, sometimes it is present with colic or arthralgia; it rarely exists independent of these affections. It is always partial, that is, it is limited to one portion of the trunk or limbs; it may change its site from day to day. It is never complete, always most marked on the right side. It affects generally the skin of the back of the hand and the extensor aspect of the forearm, the external side of calf, the skin of thorax and abdomen: sometimes it has its seat in the arch of the palate and uvula. On these isolated patches there is not only diminution or loss of tactile sensation (anæsthesia), but there is also diminution of sensibility to pain (analgesia), to temperature (thermanæsthesia), rare, and to tickling (hypopallæsthesia), rare (Gubler). The electric sensibility is also completely lost (9, p. 64). Manouvriez, who has minutely investigated this loss of sensation, considers the *analgesia* as the characteristic change. The insensibility to pricking or burning is almost always complete; it very rarely extends over all the body, generally affects one half, and is most marked on the right hand or wrist (13).

The attacks rarely last beyond fourteen days. They are regarded by Gubler, Rosenstein and Hitzig as dependent on the contraction of the cutaneous arterioles. Vulpian obtained experimentally the same effect by slowly arresting the circulation of a part: Gubler shows that it disappears for the time after exciting redness by friction, and when sweating is excited the anæsthesia disappears. Renaut is informed by Albert that in his experiments with Jaborandi he found the same result in lead cases (9, p. 63). But the singular distribution of anæsthesia demands another explanation than the simply vascular one, *e.g.* Tanquerel describes a case where it affected one half of the hand, the muscles preserving their mobility; Renaut describes three cases under Vulpian where hemianæsthesia was present with hemiplegia (9, p. 166; also Obs. x).

87. *Ataxy.*—Raymond first drew attention to this disturbed co-ordination of muscular movement, the nature of which he illustrates by two cases; the first one is reported among the observations given at the end of these remarks (Obs. xi). Here the muscular ataxy combined with anæsthesia followed an attack of encephalopathy, and was shown principally in the movements of the upper and lower extremities, especially of the left side. He clearly shows this could not have been a case of ordinary locomotor ataxy. The condition in his second

case was well marked. The patient had all the usual symptoms of locomotor ataxy, so much so that a natural doubt arises whether this was an attack of this disease affecting a lead subject; or was it the direct action of the lead on the spinal cord independent of predisposition?

88. Brouardel has drawn attention to the property lead has of greatly lengthening the normal time between the making of a tactile impression and the instant it is perceived by the brain.

89. *Amaurosis.*—The occurrence of blindness in lead-poisoning has long been known; in addition to the cursory mention of it by several writers it has been described by Tanquerel (1839), more accurately discussed by Hirschler (1866), and by Meyer (1868). Attention has been especially called, in England, to this affection by the publication of a series of cases by Hutchinson (*Oph. Hosp. Rep.*, vol. vii, p. 6, 1871).

This disease may arise independently of encephalopathy; according to Tanquerel it occurs before, during, or after the attack. It generally comes on suddenly, soon reaching its intensity, being either complete or incomplete. There is dilation and often absolute immobility of the iris; sometimes the iris is unequally dilated. No pain is felt in the eye, which looks quite clear; there is never turgescence of conjunctiva or sclerotic; no lachrymation. The attack is attended with extreme depression.

When the sight is returning objects are seen imperfectly; sometimes it is the centre, sometimes the circumference of objects that are distinguished, so that the first and last letter of words can be read, but not those in the middle. The slower an attack is in coming on so is the recovery more tedious (7, ii, p. 216).

Renaut has divided this affection into three different groups (9, p. 30): 1st. Where there is no cerebral disease; 2nd, alterations consecutive to lesions of neighbouring organs; 3rd, alterations dependant on albuminuria.

90 (1st). *Inflammation and idiopathic atrophy of the optic nerve.*—In this group there is no cerebral disease; it will be best illustrated by the following case. A painter, who at another time had colic, has lately been grinding lead colours without adopting any precaution. For six days his sight has been diminishing: the pupils are a little dilated; visual acuity, to the left = 11·100, to the right = 12·20; the field of vision normal to the right, central scotoma badly defined to the left. The papillæ are strongly injected, not swollen, they have lost their transparency; their edges are badly defined in the inner portion, where a light reddish veil covers them; this opacity scarcely exceeds the limits of the papilla. Arteries of normal diameter, but very tortuous, especially towards the left; veins very difficult to distinguish from the arteries.

Blue lines on gums, constipation, greyish colour of the skin. Amelioration of the sight after purgatives, and iodide of potassium (9, p. 70). This case and another, which Renaut also quotes from Schneller, prove the existence of idiopathic alterations in the papillary portion of the optic nerve.

Amaurosis due to lead may exist, according to Horner, independent

of any inflammation; he believes there is then, from the first, atrophy of the optic nerve, similar to that in drunkards and anæmic subjects.

91 (2nd). *Alterations consecutive to neighbouring organic lesions* engorged papilla (of Gräfe) or false neuritis (of Landott).

This consists in an œdema of the papillæ, due to pressure on the optic nerve by liquid collected in the intervaginal space.

A worker in lead has had an attack of encephalopathy, and rapidly his sight diminishes. Examination by the ophthalmoscope shows typical engorged papillæ, *i.e.* very swollen, veins dilated, opacity extending scarcely beyond the papillæ to the retina. The sight is restored in a few weeks; no albuminuria present at any period.

92 (3rd). *Albuminuric retinitis, and anæmic amaurosis.*—These are met with in cases of chronic lead-poisoning suffering from albuminuria (vide *ophthalmoscopic lesions*, Obs. viii). The prognosis is more unfavourable in the first and second group, especially when there is pronounced atrophy of the papillæ, and much more favourable in the third (Tanquerel).

93. Gower mentions a transient amblyopia, without ophthalmoscopic changes, which is usually sudden in onset, and may be complete. It has been observed in some cases of acute saturnism after but short exposure to the exciting cause. It commonly soon passes away, and is probably due to a direct effect of the lead on the nerve centres, analogous to the temporary amaurosis of uræmia and diabetes. In one case recorded by Fano there was, for some months, a periodical transient failure of sight at the same hour every day (*Medical Ophthalmoscopy*, Lond., 1879, p. 206).

Urinary Organs.

94. The elimination of lead takes place principally through the kidneys; this has been proved experimentally on animals, and by observations on patients.

The appearance of albuminuria, in chronic lead-poisoning, had been casually noticed, from time to time, by various physicians, but Ollivier was the first to show its dependence on lead. His experiments on animals demonstrated the presence of lead in the kidney, and in the urine, and to its elimination he attributed the morbid lesions of albuminuric nephritis (6).

Ollivier in his examination of thirty-seven lead cases, in La Charité, Paris, found in nine of them, that albuminuria was present in various degrees. In eight the albuminuria was temporary, not lasting more than ten days, in one it was intermittent, in four it was persistent. In one case, which died, the kidneys showed the lesions of Bright's disease in the stage of atrophy of the cortical substance (Obs. v). The anatomical appearances in this case, and in the animals poisoned by lead, presented the same differences which exist between the first and last stages of albuminous nephritis.

Dickinson in this country has fully confirmed the observations of Ollivier. Out of forty-two deaths occurring in St. George's Hospital, among workmen suffering from lead, twenty-six had distinct granular

degeneration of the kidneys; in most of these cases this renal lesion led to their death. Grannlar degeneration is, with few exceptions, which take the form of tubal nephritis, the only form of renal disease which lead appears to induce. Granular degeneration, in consequence of lead-poisoning, frequently is present when there are no external signs of gout. The constancy with which permanent albuminuria and granular degeneration are produced by saturnine occupations is one of the most definite points in pathology. Dickinson thinks it may also set up a temporary tubal nephritis (15, p. 343); vide *Gout*, § 100.

95. The stage of the lead impregnation has to be considered in estimating the condition of the urine. According to Bouchard, in the early stages, the urea, uric acid, phosphoric acid and chlorides are diminished; the colouring matter is increased. When the impregnation is confirmed the same changes continue, together with a diminution in the quantity and sp. gr. of the urine.

He at the same time examined the blood, and found the urea, uric acid and phosphoric acid increased in quantity. On these grounds Bouchard supposes that the changes in the confirmed cases are due more to loss of the eliminating power of the kidneys than to disturbances in disassimilation (16).

Garrod had previously shown that, in chronic saturnine impregnation, the blood contains uric acid in excess, and that the administration of lead diminishes the excretion of uric acid by the kidneys (vide *Gout*, § 100).

96. Renaut, under the clinique of Gubler, at the Beaujon, Paris, has carefully noted the urinary conditions in forty-nine cases, with additional observations from other sources.

Without following his divisions it may be stated that if the lead influence has not caused much cachexia, the urine may be normal in colour, density, and quantity. Sometimes, but rarely, the acidity is diminished and the urine is alkaline. As the cachexia advances the urine takes a colour like old Rhine wine, no change in quantity, clear, and containing no excess of uric acid.

97. As the cachexia is confirmed, so the urine changes to the type which Gubler calls *hæmapheic*. This hæmapheic urine is generally accompanied by more or less yellow tinge of the skin. These two symptoms appear and disappear together. Whenever saturnine icterus is present the urine is always hæmapheic. Gubler attributes this appearance of the urine to the destruction of blood-corpuscles, hence an excess of hæmoglobin which the liver ought to convert into bile. Hæmaphein is an intermediate step between hæmoglobine and the colouring matter of the bile. It indicates either excess of corpuscle destruction or hepatic insufficiency; probably both causes operate.

The hæmapheic urine resembles in appearance that in hepatic jaundice, it has no greenish reflexion, nitric acid converts it into a mahogany colour, signs of biliary acids absent; the quantity of urine is diminished; it stains the linen a rose salmon colour.

98. If acute symptoms now come on, such as colic or encephalopathy, there are considerable changes in the urine. The characteristic appearances are a brick-coloured sediment, and albumen. The latter

may, however, appear, in advanced cachexia, without the occurrence of an acute attack.

This albuminuria may be either temporary or permanent, and be attended with more or less microscopic appearances of renal disease (9, p. 98).

In a case of subacute poisoning, arising from eating butter kept in brine, and affecting twenty-four persons, the cause of death was returned as calculous nephritis with renal abscess. There was no suspicion of lead-poisoning until the medico-legal examination proved it to be the cause of the uræmic symptoms (Obs. ii).

Ollivier, Dickinson and Bouchard consider the albuminuria to be essentially renal. On the contrary Gubler attributes it to changes in the blood, and he ranks the kidney lesion as secondary. There is not, as yet, sufficient evidence to determine this point, but probably further experience may show, that as in Bright's disease, so in lead-poisoning, Gubler's theory may in many cases, but not all, be correct.

99. When lead excites colic, especially in the renal form, the cramp-like pain sometimes causes more or less retention and even some amount of suppression of urine. Adams reports a rare circumstance in the case of a man, æt. 38, temperate and previously healthy, who from drinking water conveyed in lead pipes suffered from lead-poisoning. He had colic, arthralgia and slight paralysis, then he suffered from paralysis of the sphincter of bladder which allowed the urine to pass guttatim. Soon after this he had epileptic attacks. The recovery was tedious; the paralysis of the bladder was the first symptom which disappeared (20).

Gout.

100. The circumstance that lead is a predisposing cause of gout has been noticed by various early writers; Musgrave, Huxham, Falconer (1772); and Dr. Parry in 1807 wrote a paper headed "Gout from Lead" (Publ. Lon. 1825). In later times various writers, especially Todd, Charcot, and Garrod (*Med.-Chir. Jour.*, xxxvi, 1854) have established the prevalence of gout among workers in lead. The last writer suggests the question, Can lead impregnation induce gout without the co-operative aid of other predisposing causes?

101. To ascertain the manner in which lead acts, Garrod made several observations and experiments, consisting first in ascertaining in several instances the condition of the blood and urine of patients under the influence of this metal, and secondly in determining the effect which lead has upon the secretion of uric acid, when administered medicinally.

From a table of twelve cases it will be observed that uric acid is almost invariably present in the blood in cases of lead-poisoning, not only in those who have previously suffered from gout, but even where no symptoms of that disease had ever shown themselves. Nine never had gout, in one of them no uric acid was found in the blood, but in the others it was noticed—in one moderate, in the other abundant. He had two opportunities of testing the action of lead upon the secretion of

uric acid by the kidneys. In both patients a well-marked diminution of uric occurred, in the first it was most marked, being more than one half. A peculiar phenomenon was observed, namely, that after the drug had been given for a day or so a sudden arrest of the excretion of uric acid ensued, and the function of the kidneys then became more or less intermittent.

"It would appear therefore that in individuals impregnated with lead, the blood becomes loaded with uric acid, not from its increased formation, but from its imperfect excretion, and this is of much interest in connection with the fact that the subjects of lead-poisoning are, *cæteris paribus*, more liable to be affected by gout; . . . those who inherit the gouty diathesis are more likely to become poisoned by the imbibition of lead" (17, p. 243). He has seen several cases where the medical administration of lead salts has caused severe attacks of gout in patients who had previously suffered from the disease.

That lead is a strongly-marked predisposing cause of gout there can be no doubt. Garrod is not at present prepared to assert that the metal cannot of itself occasionally lead to the development of gout (17, p. 236 and 474). Charcot, with a full knowledge of the views of English writers, has come to the conclusion, founded on his experience of lead-poisoning in France, that though it is a predisposing cause of gout, he has not met with any proof that independent of other factors (*e.g.* excess of meat and beer) it has the special power to creat gout (18*a*). Renaut states that since then Charcot noticed a case under Pidoux's care in which they were unable to find any cause whatever for the gout except the action of lead (9, p. 117).

G. Moore, who has had a large experience in lead diseases in the Staffordshire Potteries, writes: "My conviction is, that when a man, the victim of plumbic impregnation, is, as he may be, seized with gout or with rheumatism, the event is not a sequence" (24, p. 276).

As far as present evidence goes it is more probable that lead predisposes to but does not create gout. Lead arthralgia has no resemblance to gouty swellings and pain.

Genital organs.

102. The action of lead on these organs is, principally, manifested in neuralgic and myalgic pains.

These pains are generally connected with the colic, they are rarely met with unless the person is suffering or has suffered from colic. Tanquerel regards them as separate pains, for they do not radiate from the hypogastrium; they sometimes increase with the abdominal pains, sometimes they occur independent of them (7, i, p. 222).

The pains are tearing or constrictive; they are unattended by any swelling or tenderness, they are relieved by pressure.

103. *Male.*—They affect the spermatic cord, the testicles, and the penis.

The scrotum is retracted, the testicles drawn up towards the groin: sexual appetite ceases; there are no erections or emissions.

Sometimes renal colic extends to the urethra, causing strong and

sudden contraction, and suddenly arresting the stream of urine, with sometimes a sense of heat before and after micturating. The spasm will sometimes cause retention, and Desbois de Rochefort mentions a case where it prevented the introduction of a catheter. The penis becomes smooth, and is so retracted that it almost disappears: there is a sensation as if it were tied at its root.

104. *Female.*—The pains affect the uterus and vagina, they have been compared to severe labour pains; during the continuance of the pains the vagina is much contracted. Dr. W. Neftel, of New York, has published a brief outline of vaginismus occurring in three young American ladies, of good position, who had for long employed a cosmetic heavily charged with lead. One lady had been married a year, but coitus could not be effected; the two other cases were unmarried. But for his experience in the first case he would have viewed it as a hysterical hyperæsthesia. The only sign of lead-poisoning he reports is paralysis of the extensors of the hands: no mention is made of colic. As the paralysis disappeared so in proportion did the vaginismus. Treatment: galvanism and iod. pot. (*Centralbl. f. die med. Wissensch.*, 1868, p. 819).

105. The influence of lead on menstruation is not sufficiently investigated. Young girls working in white lead manufactories, long before they get colic, suffer from retarded menstruation, and in older subjects there is suppression of the menses. All show marked anæmia-chlorosis, and are styled by their neighbours "white-lead ghosts." Hysterical states are extremely prevalent, and the paroxysms particularly violent; chorea and epileptiform convulsions are alarmingly prevalent ("Employment of Women in Leadworks," Lewis, *Med. Gaz.*, November, 1872, p. 538).

Dowse, from a large experience among women working in the white-lead works in the north-east of London, states that amenorrhœa is very frequently and rapidly produced in the married and unmarried (*Med. Gaz.*, i, 1876, 357).

According to Constantin Paul women who work with lead, especially polishers, are subject to metrorrhagia; this, however, is attendant on abortion.

106. His investigations, in this direction, show the unfortunate results of lead on the pregnant uterus and offspring.

Of 141 pregnant women whose husbands worked in lead, 82 aborted, 4 had premature delivery, and 5 had stillborn children. Of the 40 living children 20 died within a year, 15 within one and three years.

Out of 43 pregnancies in women who had suffered from lead poisoning there were 32 premature births, three stillborn children, and two exceedingly pale. Out of 27 pregnancies occurring in five women—22 aborted—4 children died—1 living. One woman, who had aborted five times, left off working in lead and afterwards bore a fine healthy child. The influence of the father seems less marked than that of the mother (14). Roque, in a series of observations carried out at the Salpetrière and Bicêtre, traced a number of cases of idiots and epileptics among the children of parents who had suffered from lead-poisoning, and were temperate. He traced the history of sixteen families in which

one or more of the children were affected as above. When these parents had ceased to work in lead, and recovered their health, the children born after this were healthy and free from brain disease.

Theory of Plumbic Action.

107. Numerous experiments have been made, and various theories of lead action have been founded on them. The prevailing views have been that lead acts locally and principally on the muscular tissue, especially the unstriped, and through the latter it affects the circulation by contraction of the arterioles, hence arise anæmic cachexia, the cramps, and disease of the nervous system.

Lead is found in the blood and in all the organs, but it is most probably in chemical combination with albumen, in which condition it cannot exercise a local astringent action. Huebel's latest investigation, carried out in dogs, shows that the largest amount of lead is found in the bones, next in the kidneys, then in the spine and brain, and the smallest quantity in the muscles. So far as deductions can be drawn from these instances of comparatively acute poisoning, they militate against the local and astringent theory (12, p. 583).

It is most probable that the elective affinity of lead is particularly to the cerebro-spinal axis, and secondly to the muscular tissue.

The paralysis of lead is by most writers considered as peripheral. It has been objected to this view that lead shows a preference for certain muscles, acting more on those of the extremities than of the trunk, and upon the extensors rather than the flexors. Todd explains this by supposing that those tissues in which the nutrient changes are most active receive the largest proportional supply of blood, hence the blood poisoned by lead circulating in these will produce more decided effects than in parts where the circulation is less active, and he considers this accounts for certain muscles being more affected than others (22, p. 40).

Hitzig gives a further explanation by attributing the partiality for certain muscles to peculiarities in the supply of blood. These explanations do not meet all the difficulty, and are opposed by the circumstance of cases where muscles are affected which are comparatively little used in comparison with unaffected ones which are much used, and also by the peculiar localisation of the paralysis, and its sometimes hemiplegic character. The peculiarities of the anæsthesia and arthralgia, also the morbid appearances occasionally found in the spine, tend to increase the evidence in favour of the neurotic action of lead being central not peripheral.

108. *Treatment of acute poisoning.*—If there has been no vomiting, it is to be induced by mechanical means or an emetic of sulphate of zinc: solutions of the alkaline sulphates of soda or magnesia are to be freely given, and in their absence milk and white of egg, with the view of producing in the stomach a comparatively inert compound of lead.

109. *Treatment of chronic poisoning.*—The indication is to excite elimination and hasten tissue changes. The first is generally attempted

by continued administration of potassium iodide,—the second by various hydro-therapeutic appliances, such as warm baths, hot-air and sulphur baths, free internal use of water. The prophylactic means consist in whatever contributes to the cleanliness and temperance of the work-people, and the free ventilation of the workshops. Tanquerel strongly advises that no one person should be continuously employed on the same kind of work when this exposes him to danger, but shifted from time to time to less dangerous portions of the manufactory. According to Hirst milk is a perfect prophylactic among the Saxon miners; he states that no workman who uses it habitually ever suffers from lead-poisoning (*Die Krankheiten der Arbeiter*). At Hebburn on the Tyne, where there are extensive works for de-silvering of lead according to Pattison's process, and for the manufacture of white lead, stringent regulations are laid down as to the use of baths and other modes of cleansing the skin. Provision is also made for a daily supply to all hands of milk, beer, and acidulated drinks to be used for the purpose of washing out the mouth: respirators are also provided. At some works on the Continent where the lead-workers were at one time subject to lead-poisoning, these soon disappeared when the work-people began to feed largely on fat meats, especially before going to work in the morning. At one manufactory where a great deal of work was done, and where at one time there were the usual attacks, a change was made in the dietary, and cheese, butter, bacon, pork, lard, and other fatty materials were largely used as the principal articles of food, with the result that for a period of fifteen years no cases of lead colic occurred. The evidence is very strong that by attention to diet, cleanliness, and other sanitary arrangements, lead-poisoning can be effectually prevented.

110. *Treatment of colic.*—There is no true chemical antidote to lead. Sulphate of alum has long been a favourite remedy, first suggested by the idea that it might act chemically by producing an insoluble sulphate. The good it occasionally effects cannot be explained chemically, for benefit takes place after fractional doses in the hands of homœopathic practitioners; and their therapeutic rule is as yet the only apparent explanation of its *modus operandi*. Kapelen, Copeland and Brachet recommend its use, whereas Grisolle and Tanquerel do not attribute any great efficacy to this drug. In ordinary practice the doses have varied from 60 to 180 grains in a day, given in solution. The experience of the homœopathic school shows that fractional portions of a grain afford good results. "Opium," says Niemeyer, "is the most effectual remedy against lead colic, and is used even by the homœopaths in full doses in this disease. We should not be afraid of using it, under the impression that it will increase the constipation already existing. There is no remedy more successful than opium in relieving the constipation in lead colic" (*Pract. Med.*, i, p. 597). The relief to the constipation is supposed to be due to the full sedative dose of the opium, but this will not explain the equally successful effects of doses from the one tenth to the one hundredth of a grain as employed in the homœopathic school. Hahnemann, in his Introduction to Opium, states that the small dose of this drug calms the colic by relieving the constipation to which it stands in the relation of close

similarity. In the large dose the directly sedative as well as specific effect is produced. Platina is also a remedy which may be useful: cuprum is indicated when the colic is complicated with cerebro-spinal symptoms: also veratrum and secale.

112. *Treatment of encephalopathy.*—Tanquerel and many others who have had experience in this disease consider the expectant plan the best for the patient, prescribing merely light diet and diluent drinks.

Homœopathic records, as far as the writer knows, afford no experience on this point. The remedies in the delirious forms might be belladonna and stramonium; in the comatose varieties opium, crotalus, and naja, and in the epileptic attacks cuprum, agaricus, and veratrum. The uræmic form will require terebinth internally and as epithems to the loins; arsenic, mercurius corr.; hot-air baths.

113. *Treatment of the paralysis.*—Strychnine is the ordinary remedy, but has been much over-lauded and over-used. A committee, in America, appointed to report on the diseases arising from lead pipes, "believe, however, if the remedy be judiciously given and persevered in for months that the disease will generally yield" (20).

Lead paralysis, arising from poisoned water, passes away in months without any treatment by simply ceasing to drink from that source.

Potassium iodide as an eliminant, combined with localised faradisation, is a favourite and useful treatment. The latter of itself is a valuable remedy, if not used too strong or too long, to stimulate the atrophied muscles due partly to the poison, partly to the rest. Harm is done if the induced current is much used before the muscles have so far recovered as to contract under its influence,—too much stimulus being as destructive as too much rest of the integrity of muscle. Carefully conducted gymnastic movements of the weak muscles combined with the *massage* are useful.

Obs. I. *Acute Poisoning with the Acetate of Lead. Rapid recovery.*

M. A—, aged 41, was admitted into Guy's Hospital May, 1846, labouring under symptoms of poisoning by sugar of lead. It was ascertained that two hours previously she had swallowed about one ounce and a half of sugar of lead, or half a teacupful, dissolved in some water. She felt ill almost directly; had a nauseous metallic taste in her mouth, with a burning heat in the mouth, throat, and stomach. She took some more water to wash down the taste. This made her vomit, and thus she was detected by her friends. Her mouth became very dry; had great pain at the pit of the stomach, and excessive vomiting.

On admission, *i. e.* about two hours after the poison had been taken, she felt sleepy and stupid, alternately perspiring and shivering. Complained of violent twisting pain in the abdomen, but this was relieved by pressure; with this there was a sensation of sickness. She felt exceedingly weak and languid; complained of a feeling of cramp in the thighs, and numbness all over the body, with giddiness. The gums felt to the patient to be in lumps, and there was apparently a blue line

on the edge; they were very tender. The saliva seemed rather in excess; and the breath was foul. Magnesia mixture and sulphate of zinc were given to encourage the vomiting, followed by some castor-oil, which acted two hours afterwards. The pulse was hurried, and the tongue coated; countenance anxious and excited; skin dry, cold and hot alternately. The urine passed very freely. Was menstruating at the time, and this stopped the discharge. Breathing impeded from pain in the bowels. The next day there was pain all over the body, with numbness and sickness. On the third day she was very sleepy, but in less pain. For several days the abdomen was excessively painful on the slightest pressure. She left the hospital in five days (4, p. 431).

Obs. II. *One of twenty-six persons, who were all seriously affected by eating butter, the brine of which contained lead. This case died.*

M. Carbonnier became ill on May 4th, 1873; he suffered especially from very painful colics and bilious vomiting. The medical attendant did not notice any blue line on the gums, but other persons did: skin yellowish. The patient complained of great heat and pain in the renal regions, where a diffused doughy feeling was thought to be felt, leading to the idea of calculous perinephritis with diffused phlegmon over left kidney. The constipation was very obstinate, the urine very red and scanty: pyrexia, pulse 120.

The patient remained conscious up to the time he died, 23rd May. No autopsy was made, as then there was no suspicion of poisoning. This and the following case (Obs. iii) formed the subject of a medico-legal investigation made by Bergeron and Lhôte, who found chloride of lead dissolved in the chloride of soda of the brine in which the butter was kept. They attributed the death to uræmia due to the lead (Tardieu, *Empoisonnement*, 1875, p. 877).

Obs. III. *Occurring under the same circumstances as Obs.* II.

A coachman, aged 26, became ill on April 26th, 1873; he had severe colics with constipation, he rapidly became weak and cachectic, loss of appetite, fever, bilious vomiting. He was supposed to be suffering from typhoid fever.

He was admitted to the hospital on the 3rd May. He had then delirium with great agitation, this was supposed to be due to alcohol, he had also at the same time epileptiform convulsions, and died comatose on the 5th May.

The *post-mortem* examination showed no lesions of typhoid fever in the intestines.

The brain presented the appearances often seen in saturnine encephalopathy; it was hard, the convolutions flattened and effaced. The chemical examination proved the presence of lead in the intestines, liver, and brain (Ibid., *loc. cit.*, p. 19).

Obs. IV. *Acute poisoning—marked by rigidity and numbness. Recovery.*

An ounce of the acetate of lead was accidentally swallowed in solution; the symptoms were at first colic pains and vomiting, in the course of a few hours vomiting and tenderness, and, after these symptoms receded, a peculiar state of rigidity and numbness which was not entirely removed for some days. Five hours after taking the poison the stomach-pump was used (Christison *On Poisons*, 1845, p. 556).

Obs. V. *Numerous attacks of colic; persistent albuminuria; paralysis of the extensors of the arms; sudden death. Atrophy of the cortical substance of kidney; alteration of the muscles and nerves in palsied limbs* (*Aug. Ollivier*, 6).

A. Duhamel, aged 56, a house-painter for forty years, of middle height, born of healthy parents, was admitted into La Charité, Paris, 14th August, 1863. Every two or three years he has had attacks of colic, the last being in June; otherwise he has been in good health.

Present condition, trembling of the voice (for now twelve years), the colics have nearly disappeared: characteristic blue line, slight diarrhœa, the abdomen is soft, and not painful to pressure.

The hands tremble a little when extended, paralysis of the extensor muscles. Marked loss of muscular power of both arms, sensation intact; pains in the knees and ankles, without swelling or redness, occasional cramps. No trace of œdema. Heart and lungs normal; special senses intact.

Skin dry, cool; pulse 80, regular, full.

The urine is pale and contains much albumen and a considerable number of renal cells; lead found in the urine.

17th.—Same condition of urine, and other symptoms, pulse 96.

24.—Complains of weakness; the urine is hazy when treated by heat and nitric acid, but gives no deposit.

Sept. 2nd.—The paralysis of extensors is less marked; the urine still albuminous, the patient, feeling better, wishes to leave. He resumed his work for sixteen days, but the return of colic and increase of paralysis obliged him to desist, and he re-entered the hospital Sept. 28th.

He looks very pale; extreme emaciation; sharp colic, and constipation; paralysis of extensors of arm, forearm, and hands; great weakness of lower limbs. Embarrassment of speech, trembling of the tongue, twitchings of the muscles. Intelligence and sensibility not affected. Pulse 120, small; respirations quick; nothing abnormal in heart or lungs. The urine very albuminous.

29th.—Passed a delirious night, but is now calm, symptoms as before; the spleen normal, but liver retracted. Urine very albuminous; containing numerous casts.

At 9.30 p.m. he took soup, at 10 he attempted to leave his bed to go to the closet, and suddenly expired after crying out, "I am dying,"

and making half a dozen noisy inspirations; the tongue projected from the mouth.

Autopsy made twenty-eight hours after death. Very marked rigor mortis.

Head.—Sinus of dura mater gorged with blood: absence of serosity in arachnoid; membranes of pia mater congested. The lens shows congested capillaries on the periphery of brain and cerebellum, and minute extravasations of blood. The arteries at the base of brain and cerebellum give negative results.

Thorax, nothing in lungs to report. *Heart*, no blood in right side; the aortic valves healthy, the mitral a little thickened and rough at their base.

Kidneys.—Notably diminished in size: numerous granulations on the surface, colour yellowish, the cortical substance opaque.

Needless to give the microscopic examination; Ollivier describes them as the alterations present in Bright's disease arrived at the stage of atrophy of the cortical substance.

Obs. VI.

Ollivier adds a note of another case of a house-painter, aged 46, sober, and not syphilitic, whose health was always good until 1860, when he had severe colic, and after this several attacks with cerebral symptoms. He entered the hospital on the 8th Oct. with encephalopathy and died comatose next morning.

Autopsy.—Notable augmentation of the substance of the brain, which appears increased in volume.

The kidneys are irregular on their surface, the one normal, the other much diminished in size. The fibrous capsule is easily detached, and under it are seen numerous granulations. The kidney on being sliced presents a marked yellow colour. The microscopic examination reveals the characters of advanced Bright's disease.

Obs. VII. *Colic, saturnism and paralysis of extensor muscles of forearms: attacks of gout; albuminuria and uremia. Atrophy of the extensors. Atheroma of vessels: hypertrophy of heart: interstitial nephritis. Uratic infiltration of various joints.*

L—, aged 43, a house-painter since he was eight, had at fifteen his first attack of colic, since then he has had five. About four years ago he was attacked with paralysis of extensors of forearm; this has never wholly disappeared. When thirty-seven, he was suddenly attacked with acutely painful swelling of the left big toe; this disappeared in eight days; this was replaced by similar affection of the right toe.

Three similar attacks since; the last August, 1869; this was not confined to the big toes, but affected also the tibio-tarsal articulations, the heels, and finger-joints. This attack lasted about a month, and the feet were swollen during that time. He then returned to his work,

which in November he was forced to quit owing to palpitations and oppressed breathing, especially on going upstairs.

He was admitted into La Charité, Paris, January 5th, 1870.

The skin is of a distinct yellow colour: lips livid, face very slightly swollen, but there has never been œdema of the limbs. Paralysis of the extensors of both forearms: if he raises the wrists he cannot but with great difficulty extend the fingers. Breathing oppressed, the respiratory sounds normal: pulsations of heart strong, sounds normal. The urine pale, almost without colour, albuminous: he has never noticed deposits of uric acid. His father died asthmatic, aged 56, one sister died from chronic pulmonary disease. Pot. brom., sulphur baths.

January 10th.—Mucous vomiting, in the evening vomiting of food; constipation, headache, drowsiness, vision cloudy. Urine a little over two pints. Sp. gr. 1010. Ol. Ricini.

From the 10th to the 22nd the vomiting of bilious matter and food continued. On the 24th sudden loss of consciousness, followed by convulsions of the muscles of the face and limbs, with foaming at the mouth; leaving swelling and congestion of the face. Seen in the forenoon, his features are swollen, dull look, speech embarrassed, head heavy. He complained of violent one-sided headache, like migraine, which he has been subject to for a year. Slight epistaxis; pulse 100, strong and vibrating, cardiac impulse strong: vomiting, obstinate constipation. Urine becoming very hazy on addition of nitric acid, this disappears on adding an excess of acid, and a reddish colour appears: no sugar. Microscopic examination shows a few hyaline granular cylinder casts, and phosphate of lime: about a quart of urine passed daily.

This state and recurrence of frequent epileptic convulsions continued until February 6th, when deafness and great diminution of sensibility were present: the speech is laboured, sleeps very heavily, with snoring. Urine reduced to a pint, pulse 84. On the 9th the symptoms increased, a small quantity of urine passed in bed. On the 10th epistaxis, involuntary motions, urine still albuminous: the patient rises up without knowing what he is doing, at other times he is drowsy: during the night of the 11th the coma increased, and he died suddenly at 6 a.m. without the slightest movement.

Autopsy.—Absence of œdema or anarsarca.

The metatarsal phalangeal articulations are lined with numerous whitish deposits of urate of soda. The articulations of the big toes have their cartilages and their ligaments encrusted with abundant deposits of the same salt. Very fine deposits seen in fingers-joints.

The extensors of the fingers, the extensor proper of little finger and index, the long abductor and short extensor of the thumb, are pale, yellowish, and atrophied.

The other muscles of forearm are healthy. Microscopic examination of the atrophied muscles shows a great number of the primitive fibres much diminished in volume, but retaining their striæ: at some points the muscular fibres only present the sarcolemma, showing in its thickness nodules which are more numerous in proportion to the atrophy.

The branches of the radial nerve show granular degeneration of their myeline.

The brain and spinal cord are normal.

The lungs show old adhesions; the bronchial glands are enlarged.

Heart.—Patches of fat on its anterior surface and sides; large milky-looking patches at the root of the aorta and on the anterior surface of the auricles. The left ventricle is firm, red, and considerably hypertrophied. The mitral orifice is normal, but the aortic is insufficient owing to thickness and adhesion of the valves. The internal surface of the aorta is covered with atheromatous patches; the carotids and some of the cerebral arteries are similarly affected. The kidneys are atrophied, reduced one half in size, granular, affected by interstitial nephritis.

The stomach presents the appearance of uræmic gastritis. The stomach is enlarged; the liver and pancreas are normal (E. Lanceraux, *Mem. Soc. de Biologie*, t. ii, 5ᵉ serie, 1870).

Obs. VIII.—*Incomplete paralysis, albuminuric amaurosis.*

A painter, aged 35, had colic when twenty-five; ten years ago after the first attack of colic, the sight became affected. For three years he has complained of malaise, constant pain in the limbs; intense occipital headache, coming on in paroxysms; suborbital neuralgia, occasional; the urine is albuminous. The sight, especially in right eye, has been gradually getting weaker, during the last seven weeks this diminution of vision has prevented him working.

He looks ill and thin; there is no œdema. Muscæ volitantes, circles of fire, difficult to see objects in the evening, impossible to read; these symptoms worse in right eye; pupils dilated, especially the right.

Ophthalmoscope shows—in left eye localised granular degeneration, exsudates masking the papillæ and exit of vessels, right eye, degeneration more limited, but exsudates more numerous masking the vessels in a great part of their course (L. Danjoy, *Arch. gen. de Méd.*, 1864, i, p. 402).

Obs. IX.—*Colic, paralysis, encephalopathy, albuminuria (MM. Vulpian and Raymond).*

M. Zulma, aged 37, was admitted 22nd May, 1872, under M. Vulpian's care.

The father died at 55, probably of alcoholism, the mother at fifty-eight of paralysis. The patient has been a house-painter since he was seventeen, and enjoyed good health until six years ago when he had violent colic, followed in about ten days by paralysis of the hands, cramps in the hands, and wandering pains in the body. He had a second attack four years ago; the following year another, and his fourth a year after.

His fifth attack commenced fifteen days ago, the colicky pains very severe with increase of the paralysis.

On admission the pains are slight; thirst, white tongue, no appetite,

constipation, no fever. He complains of cramps and continued pains in all the limbs, especially in the deltoid region.

The extensors of the forearm are completely palsied; slight trembling of the hands. The electric sensibility has disappeared. Breathing normal, but complaint is made of slight pain in the region of the diaphragm on inspiring.

Strong palpitations of the heart, slight blowing murmur with first sound towards apex.

Sensibility is not affected.

Marked albuminuria.

The patient presents a marked yellow cachectic look, and blue line on the gums.

He was treated by electro-magnetic currents and iodide of potassium, which were continued up to June, 1873. In July, not feeling well, he kept his bed for a few days, and on getting up on the 10th he complained of confusion, and stumbled against things. At 11 a.m. he was seized in bed with a severe epileptic attack; no aura, marked cry; tetanic stiffness of the neck and of the limbs; complete loss of consciousness, respiration ceases for a moment; face purple, with congested spots on forehead and face, convulsions of the muscles of the face; slight clonic convulsions, foaming at the mouth, tinged with blood. This condition lasted three minutes, the limbs relaxed; after half an hour of coma and stertorous breathing, semi-consciousness returned, but with great drowsiness. During the day two more attacks, but less severe. The urine contains much albumen. The administration of iodide of potassium renewed.

July 11th.—He looks exhausted and is drowsy, he makes no complaint of pain; the vision is very indistinct, he distinguishes nothing, remembers nothing of yesterday.

12th.—Still marked albuminuria, the intelligence returned, and vision restored; he complains of distressing pulsations in the temples: action of heart rapid and vigorous: pains in both shoulders.

14th.—The albuminuria has nearly disappeared, abundant deposits of urates and uric acid: strong traces of iodide of potassium.

22nd.—General state of health good. Electric appliances were used up to March, 1874, when he left much improved.

It is to be remarked that two years after having ceased to work with lead, and though so long under the influence of iodide of potassium, he was attacked with epilepsy (9, p. 156).

Obs. X.—*Hemiplegia, anæsthesia, analgesia* (*MM. Vulpian and Raymond*).

J. Dumont, aged 46, worker for eighteen years in white lead, was first treated at La Pitié, May, 1871, for lead colic. He was readmitted 4th March, 1874, suffering from severe colic. He had given up working in lead since 1871 owing to frequent attacks of colic; he had, however, resumed this work six weeks previously.

He has never suffered from cerebral disease or paralysis; he is temperate and he is not syphilitic.

For the last fifteen days he has been feeling sense of weakness in the right side: he is not intelligent, but answers distinctly to questions.

He has frequent headache: slightly deaf on right side.

All the right side of face is affected by marked anæsthesia: insensibility to touch, to temperature, but especially to pain. The facial hemiplegia is not very evident.

The arch of the palate is insensible to touch, the uvula is drawn to the left, the muscles act indifferently, and reflex movements are not excited; deglutition is improved. The tongue is strongly diverted to the left, and bent to the same side.

The voice is nasal, and words are not pronounced distinctly.

Blue line on gums is very marked.

The motility of the right upper extremity is diminished, and there is a certain amount of atrophy of the posterior muscles of the forearm. The extension of right wrist is more difficult than of the left; the sensibility over the extensors is destroyed, as regards touch, temperature, and pain.

Walking is difficult, he drags the right limb, and on examining him in bed the weakness of this leg as compared with left is evident. The toes of right foot are contracted like claws.

Complete anæsthesia and analgesia of right limb, these conditions extend up the right side of abdomen, of loins, and of thorax, keeping to the right of median line anteriorly and posteriorly. A prick gives the sensation of rubbing, and a pinch that of simple touch.

The umbilical region is painful to touch: constipation for eight days.

Blowing murmur more marked in the vessels of the neck: urine normal.

He was treated with strychnine, iodide of potassium; up to the 10th May there was no appreciable change; the electric contractility is much diminished in the right compared with the left side, this is especially evident in the extensor muscles.

June 1st.—He has gained strength and walks much better, the right leg now shows hardly any trace of dragging. In six months all the symptoms had almost entirely ceased.

Raymond remarks on this case, that the diagnosis *lead paralysis* was indisputable. There was no question of hysteria: the paralysis came on slowly without any precursory symptoms, no apoplectic attack; the electric sensibility disappeared in the paralysed limbs, and contrary to what occurs after cerebral hæmorrhage the limbs are irregularly affected, and the groups of muscles are unequally palsied.

It reminds him of similar symptoms in another lead case, when the signs of paralysis (sensibility and motility) were more marked on one side than the other, loss of hearing, smell, taste &c. (9, p. 166).

Obs. XI. *Encephalopathy, ataxy (Raymond and Vulpian).*

L. I—, aged 46, of a healthy family, has worked for three months in a lead manufactory at Clichy; towards the end of this period he ha severe attacks of colic. A few days after this he was seized, on March

23rd, with a marked encephalopathy; while washing his hands he fell down insensible, he then had convulsive movements; this attack lasted two hours. Five days after he had another similar attack which lasted an hour. He then ceased working in lead; about April 2nd he remarked that he could not use his hands when he wished to eat; if he attempted to lift a glass to his mouth his arm shook so that he was unable to drink. Next day he experienced slight formication in the lower extremities, and in four days he walked with difficulty, he was obliged to lean on something to avoid falling; he also felt sharp one-sided headache, with diminution of sight and hearing, especially on the left side. As the legs became worse, the loss of co-ordination in the arms diminished.

He was admitted into the hospital April 8th, 1874; he had enjoyed fair health previously to working in lead; he had not suffered from syphilis or alcoholism.

Marked blue line on gums.

Violent left-sided headache, with nocturnal exacerbations. Slight anæsthesia of left side of face, otherwise face normal; the left pupil is more dilated than right: slight deafness of left ear, with buzzing noises.

Motility. Upper extremities.—Considerable loss of muscular power, especially in left: no apparent atrophy. Pressure on the last cervical and first dorsal vertebræ excites pain, no hyperæsthesia.

There is marked loss of co-ordination of both arms, especially of the left: the patient cannot, on closing the eyes, carry the hand to a point in the face without feeling the way. Analgesia of both arms.

Inferior extremities.—Marked inco-ordination: when he wishes to make a movement it is executed with difficulty: on shutting his eyes and trying to walk he strikes his heel against the ground, he trembles, and would fall were not someone at his side.

Sensibility.—There are two painful zones over the articulations of the neck, the knee, and the feet; anæsthesia to touch, to temperature, and to pain over both limbs, especially the left.

Increased reflex excitability, especially of left side.

Treatment and progress.—Iodide of potassium; sulphur baths twice a week. The symptoms continued much the same, the headache though persistent was less severe, until April 18th, when walking was easier, but still trembling and the want of co-ordination.

April 20th.—Pain and swelling over the wrist and back of left hand: the ring and middle finger are bent, to extend them causes pain.

26th.—The swelling of wrist is confined to the tendons of the flexors, the skin is red, and very painful to the touch. The power of movement and co-ordination improved.

May 26th.—He walked well, and showed no loss of co-ordination; he left the hospital on the 29th of June almost completely cured; it would have been difficult to trace any remains of the symptoms for which he had been admitted.

Raymond analyses this case to show that the symptoms were due to lead and not to any other cause (9, p. 170).

Obs. XII. *Arthralgia, cerebral symptoms, disturbance of hearing and vision, paralysis.*

A. Tisson, aged 50, a worker in a lead manufactory for four months, began soon to suffer from colic, for which he was admitted into the hospital. On being discharged he returned to work where he was less exposed to lead influences, but after five days he began to suffer from sharp pains in the joints and he was readmitted February 21st, 1875.

Very acute pains for now fifteen days in many joints; the most painful are those of the lumbar spine and shoulders: but all are more or less affected except jaw, fingers, and toes. Little felt when at rest, but the least movement excites them; pressing the surfaces of the joints together causes severe pain; pressure round the joints less felt. The muscles are free from pain: no redness or swelling. Sleep generally good, but sometimes wakes with starts: he also wakes when he moves; he has nightmare nearly every night, he thinks he is pursued by assassins and cannot escape.

Continued headache and frequent vertigo for fifteen days. He feels a weakness in all his limbs; buzzing in the ears, he sees showers of snow or of fire: he nearly loses consciousness, and must get hold of something to prevent himself falling. These attacks occur two or three times in the twenty-four hours; they are followed by very severe headache.

Weakness of the right hand, he can extend the ring and little finger very much less than the others; it is with great difficulty he can lift a chair with his right hand; the left is not so much weakened. Sense of numbness and formication in the fingers, especially of right hand, which are followed by painful prickings. No loss of sensibility in legs, but the right is weaker than the left.

Anæsthesia and analgesia of all the right upper extremity: the skin can be pierced with a needle without causing pain.

Pupils equal and contractile: tongue clean and moist, bowels costive; pulse regular, 64; urine normal, no albumen.

23rd.—One vertiginous attack yesterday; increase of paralysis of extensors of right hand; still the anæsthesia extending as high as the insertion of deltoid. Sensibility less in right lower extremity than in left, but no anæsthesia: the sensibility of each side of trunk is equal. Sight of right eye feebler than of left; is unable to read with right alone; no diplopia. Hearing of right ear less than that of left. The articular pains are as strong on one side as the other.

March 2nd.—No vertigo for four days; constant headache. Sleep good but for nightmare: the pains in articulations still great, no myalgia: the paralysis is less. The report ceases at this date (9, p. 175).

Obs. XIII. *Experiment by Dr. Spence, of Virginia*, 1804.

He began by taking ¼ gr. acetate of lead three times a day, gradually increasing the dose until at the end of the week he was taking 8 grs. twice a day.

The symptoms noticed by him were spongy gums, livid appearance round the incisors, fœtid breath, looseness of teeth without soreness of the mouth, constipation, fæces blackened. Neuralgic pains affected the upper and afterwards the lower extremities: the appetite failed. Then an attack of colic supervened with loss of muscular power in the limbs, pulse fell from 80 to 60 (*Stillé, Mat. Med., art. Lead; he quotes from Philadelphia Med. Museum, ii*, 1805, *p.* 250).

Obs. XIV. *Experiment by Mr. Laidlaw*, 1828.

When in good health he took 60 gr. of acetate of lead in the course of four days.

He felt metallic taste in the mouth, some tenderness and swelling of the gums; tenderness and pain at the epigastrium; pulse slower and weaker. A dose of salts put an end to these symptoms. A month after this he repeated the experiment, taking 70 gr. in eight days. Metallic taste felt in two days; swelling of gums and constipation on the third day; fourth day he took a purge and these symptoms abated a little; sixth day continued acet. plumb., when the symptoms returned with constriction of the thorax and abdominal pains; ninth day all these symptoms had increased, and in addition to them there was ptyalism; sensation of tightness and numbness of the hands and feet (*Stillé, loc. cit., p.* 199, *quoted from Lond. Med. Repos. and Journ. of For. Med., Philadelphia*, 1828, *p.* 395 *and* 527).

Obs. XV. *Epileptic Coma, Albuminuria and Lead Palsy, under Dr. Todd's care.*

"J. Clarke, aged 30, was admitted in a state of profound epileptic coma; and from October 18th to 20th, he had five convulsive fits, accompanied and followed by coma, which continued for two days, when he began to recover. . . . I viewed the case then as one of those in which the cerebral affection was due to the presence of some irritating matter in the blood which ought to be eliminated by the kidneys. There are very good grounds for believing that when urea is retained in the blood, the brain is very likely to be affected so as to cause coma and convulsions. . . . As soon as recovery from the state of coma took place, we observed a paralytic affection of the upper extremities, and of these alone; the legs were in no way involved. Nor did the paralysis involve all the muscles of the upper extremities: those of the arm and shoulder were only very slightly affected; the muscles of the forearm were chiefly engaged, and of these the extensors were most distinctly paralysed. All were wasted; but the extensors most so, as was obvious from the hollow which existed over those muscles on the back of the forearm. His power to flex the wrist and grasp with his fingers was very feeble, but he was wholly unable to extend the wrist or fingers. When the arm was stretched out from the trunk, the hand hung, as if lifeless, from its articulation at the

wrist. Both upper extremities were affected in precisely the same way, although not precisely to the same degree; for the right forearm was evidently weaker than the left. The muscles which form the prominence of the ball of the thumb (the *thenar* eminence of surgical anatomists) were also paralysed and greatly wasted, and the power of flexion, or extension, or adduction of the thumb was almost entirely destroyed. . . . He was admitted on the 18th of October; on the 22nd he was quite free from any comatose symptoms, and there now remained to be dealt with the condition of the kidney (the *fons et origo* of the cerebral disturbance) and the paralytic state. The urine had increased considerably in quantity; it was still, however, very highly albuminous, becoming almost solid by heat, and of low specific gravity; and, under the microscope, contained casts of tubes and epithelium, and some blood-corpuscles. . . . It exhibits precisely the character of that form of palsy which results from lead-poisoning, more commonly known as the 'painters' wrist drop.' All the characteristic signs of this form of palsy were as well marked in this case as in any case I have ever seen. When you make him hold out his arms, you see both hands hang down, and he has no power to bring them to the state of extension.

"A practical man could not see such a case without asking if the patient was a house-painter. Yet we found, on inquiry, that not only was he not of that trade, but that his proper vocation, that of a waiter, did not particularly expose him to the lead contamination. . . . It appears that a part of our patient's duty was to clean and keep bright the pewter pots belonging to the public-house to which he was attached. This he did by friction with his hands. Now, pewter very commonly contains lead in considerable quantity, and no doubt the frequent contact of this with his hands would lead to a gradual absorption of a sufficient quantity of the metal to produce the poisonous effects; or the repeated frictions might cause the separation of minute metallic particles, which might be inhaled" (22, p. 350).

Obs. XVI.—*Lead-poisoning; optic neuritis; death; lead found in the brain; reported by Dr. Atkinson.*

A man, aged 21, admitted September 5th, 1875, into the hospital complaining of the usual symptoms of lead-poisoning, headache, constipation, vomiting, pain in abdomen; on his gums a well-marked line. He stated he had worked seven years in a lead factory, and that he had had many previous attacks of colic, but that otherwise he had been a healthy man. He was anæmic, and complained more than usual of headache; indeed, that was his most urgent trouble. His discs were examined, and it was found that he had well-marked optic neuritis, his discs having an opaque, white, glistening appearance, the opacity concealing portions of the large vessels and the margin of the disc. This material extended with an irregular and somewhat abrupt outline into the adjoining retina. Both arteries and veins were larger than normal, but no hæmorrhages were seen. On the day of admission he was very dull and stupid, and on the day following he was delirious and had a

convulsive attack followed by coma; some days later more attacks with great complaint of acute pains in the head. He died on September 20th. Contrary to what is usually seen in cases of optic neuritis which come under the physician, this man was quite blind.

At the autopsy the brain was carefully examined, but no abnormal naked-eye changes were found. Portions of brain were analysed by Dr. Tidy, who found in each portion examined an appreciable quantity of lead. He calculated that the brain, supposing the lead to have been equally disseminated throughout it, would contain at least 5 gr. of that metal. The kidneys were healthy (*Lancet*, 1878, i, 784).

Bibliography.

1. Baker, G., M.D., Three Papers in *Trans. Coll. of Physicians*, i, p. 175, read 1767, pub. London, 1785.
2. Mérat, F. V., *Traité de la Colique Métallique*, 2nd edit., Paris, 1812.
3. Christison, R., M.D., *A Treatise on Poisons*, 4th edit., Edin., 1845.
4. Taylor, Alfred S., M.D., F.R.S., *On Poisons*, London, 1848.
5. Grisolle, A., *Traité elementaire et pratique de Pathologie interne*, 6me edit., Paris, 1855, ii, p. 15. This excellent treatise embraces the information in his *Thèse inaugurale*, Paris, 1835, and articles in *Journ. Hebdom.*
6. Ollivier, Aug., "L'albuminurie saturnine," *Comptes rendus et Mém. de la Soc. de Biologie*, 3me serie, t. v, p. 172, Paris, 1864. Also *Arch. de Méd.*, 1863, 6me serie, t. ii, p. 530.
7. Tanquerel des Planches, *Traité des maladies de Plomb*, Paris, 1839, 2 vols. There is an edit. of 1850, to which the writer has not had access. Tanquerel's work has been translated into English by S. L. Dana, M.D., 1848, Lowell, U.S.
8. Tardieu, A., *Étude médico-légale et clinique sur l'empoisonnement*, 2nd edit., Paris, 1875.
9. Renaut, J., *L'Intoxication Saturnine Chronique*, Paris, 1875.
10. Moreau (René), *Recherches cliniques et experimentales sur l'empoisonnement aigu par le Plomb et ses Composés*, Paris, 1875.
11. Durosiez, "Bruits cardiaques et vasculaires dans l'Intoxication Saturnine," *Gaz. des Hôpitaux*, 1869, p. 565.
12. Naunyn, "Poisoning by Lead," in *Ziemssen's Cyc. Pract. Med.*, vol. xvii. The German authorities he quotes are: Hitzig, *Studien über Bleivergiftung*, Berlin, 1868; Kussmaul und Mayer, *Archiv für klin. Med.*, Bd. ix; Rosenstein, *Archiv f. path. Anatomie*, 39; Heubel, *Pathogenese und Symptome der chronischen Bleivergiftung*.
13. Manouvriez, Anat., "Recherches sur les alterations des diverses espèces de sensibilité, spécialement chez les saturnines," *Arch. de physiol. norm. et path.*, t. iii, p. 408, 1870.
14. Paul, C., "Nouveau fait relatif à l'influence de l'intoxication saturnine sur le produit de la conception," *Mém. de la Soc. de Biologie*, 1861, t. iii, 3me serie, and *Arch. gener. de Méd.*, 1860.
15. Dickinson, W. Howship, M.D., "Albuminuria," being part ii of *Diseases of Kidney*, London, 1880.
16. Bouchard, "Quelques alterations de l'urine chez les saturnins," *Mém. de la Soc. de Biologie*, July, 1873.
17. Garrod, A. B., M.D., F.R.S., *Treatise on Gout and Rheumatic Gout*, 3rd edit., London, 1876.
18. Lancereaux, E., "Saturnisme chronique avec accès de goutte et arthrites uratiques," *Mém. Soc. de Biologie*, ii, 5me serie, 1870.

18*a*. Charcot, "L'Intoxication saturnine, excerce t'elle une influence sur le développement de la goutte?" *Gaz. Hebd.*, 1863, No. 27, p. 433.

19. DANJOY, L., "De l'albuminurie dans l'encéphalopathie et l'amaurose saturnine," *Arch. gén. de Méd.*, 1864, i. p. 402.
20. ADAMS, HORATIO, M.D., "On the Action of Water on Lead Pipes and the Diseases proceeding from it," *Trans. Amer. Med. Ass.*, 1852, vol. v, p. 163.
21. CORSON, J., M.D., of Brooklyn, "Effects of Lead on the Heart," *New York Journ. of Med.*, Mar., 1856, p. 325.
22. TODD, R. B., M.D., *Clinical Lectures*, Lond., 1856. Lecture I, "Lead Palsy;" Lecture XVI, "Epileptic Coma and Lead Palsy."
23. HARTLAUB, C. G. C., und TRISKS, D. C. F., *Reine Arzneimittellehre*, 1828, Leipsig, erster Band: Blei.
24. MOORE, C. G., M.D., "Lead Poisoning in connection with Gout and Rheumatism," *Brit. Journ. Hom.*, xxiv, 1866, p. 209.

The following works are added, but they have not been directly consulted by the writer:

DR. BURTON'S paper calling attention for the first time to the diagnostic "blue line," *Med.-Chir. Trans.*, 1840, xxiii, p. 63.

ALDERSON, Sir J., *On the Effects of Lead on the System, &c.* Lumleian Lectures, Lond., 1852.

MIALHE, H., *Mémoire sur les émanations des sels des Plomb. &c.*, Paris, 1842. pp. 20.

BRACHET, J. L., *Traité pratique de la colique de Plomb*, Paris, 1850. To this essay the Acad. of Sciences of Toulouse awarded a prize.

LAFONT, E., *Etude sur le tremblement Saturnin*, Paris, 1870.

PINÉ DIT PINET, J. A., *Sur la Goutte Saturnin*, Paris, 1874.

DE COURS, A., *De l'Hémianesthesie Saturnine*, Paris, 1875.

Reference to special sources of poisoning by lead:

From Potable Waters.—CHRISTISON, loc cit., No. 3.

YORK, Col., *Pharm. Journal*, Dec., 1845, 279.

ADAMS, Dr. HORATIO, loc. cit., No. 20.

HARRISON, Dr., *Remarks on the Contamination of Water by the Poison of Lead*, Lond., 1852.

EFALISE, Dr., *Gaz. des Hôpitaux*, 1859, No. 119, p. 273.

TARDIEU, AMBROISE, *Dict. d'Hygiène publique et de salubrité.* Par., 2nd edit., 1862.

Les Comptes rendus de l'Académie des Sciences, 1re Dec., 1873. "Sur l'emploi de tuyaux de plomb pour la conduite des eaux destinées aux usages alimentaires;" note de M. Champouillon. "Rapport de Boudet au Conseil de Salubrité de la Seine, sur l'emploi des tuyaux de plomb," *Bull. de l'Académie*, 3me mars, 1874.

Revue des Sciences Médicales d'Hayem, 1874, t. iii, p. 517, 703, "Sur les conditions dans lesquelles le plomb est attaqué par l'eau."

Cider and Wine.—BAKER, No. 1.—FOTHERGILL, *Trans. Lond. Col. Phys.*, i.

Soda water and lemonade impregnated with lead: as much as 1 grain in gallon of lemonade. Oil of lemon impregnated from being kept in vessels not free from lead, Dr. STEVENSON MACADAM'S Report, *Lond. Med. Rec.*, Jan. 20, 1878.

Sugar.—Several persons lost their lives from eating sugar kept in leaden reservoirs (*Med. Gaz.*, xvii, 1036).

Hair Dyes and Cosmetics.—*Ann. d'Hygiène*, 1832, 324; *Med. Gaz.*, Nov., 1842.

BRAMBILLA, *Mém. de l'Académie de Vienne*, 1837.

FIEVÉE DE JEUMONT, *Gaz. Méd. de Paris*, 1855.

A girl became cachectic, constipated, and slightly palsied from powdering her face with a cosmetic. The chemist admitted that it was principally composed of carbonate of lead (*Med. Times and Gaz.*, 1864, ii, p. 279).

JOHNSTON, Dr. G.—Two cases in ballet dancers, marked anæmia, and wrist drop, &c., from powdering face with "white flake" (*Med. Times and Gaz.*, 1875, ii, p. 233). He also reports effects in a portmanteau maker who used American overland cloth, which is varnished with a mixture of chalk and carbonate of lead.

Bread.—The flour used had been ground by millstones, the holes in which had been stopped with lead: 350 persons attacked, 15 died (*Gaz. Méd.*, 1865). Similar accidents occurred in 1858 at Fresnay-le-Gilbert and at Laval. Also *Med. Times and*

Gaz., 1864, i, 250. **Bread baked** in an oven heated by old stakes covered with white paint, affected nine gardeners at **Montrouge.**

Butter.—The brine in which it was kept containing lead. (See Obs. 2.)

Snuff adulterated with red lead (*Med. Gaz.*, xxxii, 138; *Ann. d'Hygiène*, 1831, ii, 197). Snuff kept in lead canisters (*Gaz. des Hôp.*, 1856, ch. iv, p. 13. LINK, *Schmidt's Jahrbuch*, 103, p. 230; and 1861, p. 111. ZIEMSSEN, ditto, vol. cxxv, p. 174).

Culinary vessels glazed with lead, or soldered with lead (*Ann. d'Hyg. et de méd.-legale*, x, and 1872, p. 209). Observations by SCHONBROD, *Schmidt's Jahrbuch*, 158, p. 241; also 103, p. 230. A whole family poisoned (*Lancet*, July 4, 1846).

Chromate of lead—in manufactories. Confectionery (*Rev. des Sciences Méd. de G. Hayem*, 1874, iii, 693; *Ann. d'Hygiène*, 1829, p. 421; *Med. Times and Gaz.*, 1864, i, p. 48). Numerous workers affected by yellow dust inhaled from the yarn in weaving an orange-coloured cloth. Action similar to ordinary lead, except that yellowness of skin was more marked (*Lancet*, Mar. 11, 1822, p. 391). Working with wool dyed with chromate of lead—death and autopsy (*Med. Times and Gaz.*, 1864, ii, 692).

Muslin and cotton manufactories, lace cleaners, &c.: a full list given in *Tanquerel*, No. 7, i, p. 92.

ARRANGEMENT OF THE PATHOGENESIS OF PLUMBUM.

A very few symptoms have been taken from the schema given by Hartlaub and Trinks; they are marked H^b; the remainder have been omitted because they do not seem to throw light on plumbic physiological action which cannot be better illustrated from surer sources. Names followed by figures refer to the bibliographic list. Symptoms having no reference can be readily certified by turning to the physiological paragraphs from § 27 to 106. "Obs." refers to the cases given from page 693 to 705, illustrating the physiological action.

Nervous System.

Sensibility.

1. *Anæsthesia* generally confined to the skin, rarely affecting the deeper tissues; it appears with, but more generally follows motor paralysis. It is always partial, it may change its site from day to day; never complete; most marked on right side. Generally affects the skin on back of hand, extensor aspect of forearm, external side of calf, skin of thorax, and abdomen; sometimes arch of palate and uvula. In those parts there is not only loss of tactile sensation, but also diminution of sensibility to temperature, and especially to pain.

5. A prick gives the sensation of rubbing, and a pinch that of simple contact (Obs. x). Electric sensibility is completely lost. Great weakness, pain and numbness all over the body with giddiness and sickness (Obs. i). Peculiar rigidity and numbness, which lasted some days (Obs. iv). Soreness or peculiar tenderness in all my flesh: sitting in a wooden chair and leaning back, the parts of the chair seemed to penetrate to the very bones (20, p. 190).

10. Anæsthesia and analgesia confined to right side, with hemiplegia (Obs. x). A portion of a limb may be the seat of anæsthesia, and another part be suffering from intense pain.

12. *Arthralgia; myalgia.*—Pains tearing, boring and burning, sometimes like pins and needles, in joints or muscles. Not running in direct course of any nerve, they sometimes are superficial as if in the skin, at other times deepseated as if in bones or mass of muscles, have remissions, and exacerbations; worse at night, relieved by pressure. Unattended by heat, swelling, redness, and pyrexia. Accompanied often by intense cramp-like rigidity of the muscles. Affect lower much more than superior extremities: also affect intercostal muscles and back.

17. Pains are attended by sobs, cries, restlessness, constant change of

position. In a few minutes the paroxysm abates, but pain does not disappear.

18. During the remission there is numbness, formication, fatigue, and sense of constriction of affected parts.

19. Pains present very various characters in the same case at various moments, rapidly changing.

Motility.

20. *Trembling* generally preceded by progressive weakness; commences frequently with the arms, remaining localised, generally right side; affecting hands first, rarely head, rarely becoming general. May occur independent of paralysis. Increased by fatigue, worse towards end of the day, least in the morning. Electro-muscular contractility not affected.

22. *Ataxy*, disturbed co-ordination of muscular movements, combined with anæsthesia, following an attack of encephalopathy. Marked loss of co-ordination of both arms, especially of left; on closing eyes he cannot carry the hand to a point in the face without feeling the way to it; analgesia of both arms (Obs. xi). When he wishes to make a movement with the legs it is executed with difficulty: on shutting his eyes, and trying to walk he strikes the heel against the ground, he trembles and would fall were not someone at his side; anæsthesia and analgesia of both legs, especially left.—Obs. xi.

24. Increased reflex excitability, especially of left side.—Obs. xi.

25. *Paralysis.*—Generally manifested in the superior extremities, especially in the extensor muscles; but also affects the lower extremities and other parts, with the exception of the face. Attacks rarely sudden, generally progressive, slow and partial, rarely general and complete; hemiplegic form rare.

26. Preceded by sense of pain and dulness in affected parts.

27. Sometimes the paralysis exists to the same degree in two similar limbs, and affects the same muscles: at other times it only embraces a single extremity, the others being healthy. The two limbs may be affected with paralysis in different degrees, and loss of motion may affect different muscles of each side or an unequal number.

28. Electric mobility is rapidly lost, loss of electric contractility precedes that of voluntary contractility.

29. Paralysis may be accompanied by anæsthesia and analgesia.

30. Attended by sensation of fatiguing weight in the affected limbs.

31. The palsied muscles soon become atrophied.

32. Extreme sensibility to cold air in the affected parts.

33. Amaurosis and and deafness very rarely combined with paralysis of motion.

34. *Convulsions*, partial and general, presenting generally the epileptic, more rarely the tetanic and cataleptic character.

35. Never preceded by *aura*, sometimes slight vertigo, occasionally the initial cry.

36. Characterised by extreme rigidity: sometimes tetanic. Almost always confined to one side, affecting principally the upper extremity

and sadly disfiguring the face. Eyelids quite open or closed, eyes fixed or rolling: muscles agitated by convulsive twitchings, lips covered with frothy saliva; the face of a purple colour, veins of the neck swollen; respiration short and difficult, becoming noisy and stertorous.

37. The attack does not at once reach its greatest intensity, gradually the convulsions and subsequent coma become more severe and prolonged; sometimes delirium takes the place of the coma.

38. During the intervals, the return to consciousness in mild cases is gradual, very rarely at once.

In severe cases four to six minutes after attack may elapse before consciousness returns, then the intelligence is dull, and the words incoherent.

39. Sometimes the patients in waking up become maniacal, sometimes they are tormented by sad thoughts or frightful visions.

40. *Epileptic renal coma* attended by albuminuria.

41. *Cataleptic* form very rare, lasting from a quarter to one hour, then alternating with a lethargic condition, at lasting ending in violent delirium.

42. *Coma;* the patient is motionless, the eyes closed or half closed,—occasional snoring as if in sound sleep; from time to time low groans, cannot be made speak; when violently shaken wakens for a moment, then again becomes comatose.

43. The pupils are dilated, sometimes closed.

44. Sensibility and mobility are dormant, but not destroyed.

45. Occasional movement of the lips as if smoking a pipe.

46. Coma attended with slight delirium.

Perception, Ideation, Emotion.

48. The gayest and most cheerful become very depressed and suffer keen anxiety during the attacks of colic, and this mental state continues during the remissions.

49. Melancholy and dejection; great anguish and depression of spirits: this mental condition very marked during the various acuter attacks of lead workers.

50. Mental dulness, remaining long after acute poisoning.

51. After workers in lead have suffered for a long time, they become very melancholy, and desire to die.

52. The mind becomes much weakened, and the look takes on an idiotic or maniacal expression.

53. Extreme anxiety.

54. Delirium with great agitation, epileptiform convulsions, death from coma; case mistaken for delirium tremens (for *post mortem* vide Obs. iii).

55. Between the intervals of epileptic attacks the intelligence is much affected; he goes out to walk not knowing where, he knocks against passers by, and is forgetful of what he has done or said.

56. No pyrexia with the delirium.

57. Delirium attending the cerebral attacks either tranquil or violent.

58. *Tranquil delirium;* astonished stupid look. Patient appears as if ecstatic; risus sardonicus: the patient has a sad, melancholy look, and weeps. Patient gives no satisfactory answer as to the cause of his depression.

In a few hours the patient will present all these shades of expression.

59. Wandering in his speech, sometimes coherent, then suddenly changes. He thinks he hears delicious music.

60. Another imagines he is watched by a woman who says the most biting things to him; this goes on from day to day, the patient believing in its reality.

61. Alternately gay or sad, loquacious or silent. He moves his arms in all directions, will not lie in bed, desiring to lie in his neighbour's bed; upon being ordered goes quietly to bed.

62. Occasionally accompanied with great wakefulness, trembling of the face and arms, and stammering.

63. *Furious delirium;* eyes staring, menacing, and furious; the features contracted; general exaltation of all the patient's acts; screams, stamps, tears everything to pieces; can with difficulty be controlled, attempting to restrain him increases his fury. Spasmodic contraction of the muscles of the face, distortion of the eyes, grinding of the teeth. Constant muttering or rather chattering. Conversation consisting of incoherent ideas and words.

64. This furious or tranquil delirium reaches soon its greatest intensity; sometimes it lasts for days and is not distinctly marked; it then consists in an illusion of the external senses and incoherence of ideas, which produce a singular confusion of names, persons, and places. These symptoms of aberration, which are attended with trembling of the limbs and a rapid abrupt speech, are separated by lucid moments, during which the patient corrects his previously incoherent ideas. Gradually these intervals diminish and general delirium sets in.

65. Whenever the delirium is completely developed it proceeds with incredible irregularity; it is aggravated, it diminishes from one moment to another without any order, sometimes attended with regular remissions. These two kinds of delirium succeed each other irregularly, sometimes exist singly; tranquil during the day, furious at night.

66. After long continuance of delirium the mouth and tongue present the appearance as in severe typhus fever.

Sleep.

67. Two hours after taking the poison she felt sleepy and stupid, alternately perspiring and shivering; also on third day great sleepiness.—Obs. i.

68. Sleeplessness owing to pains, even when they are slight.

69. Sometimes when the pains and other symptoms have ceased there remains a continued obstinate sleeplessness lasting many days, in one case twenty (7, i, 254).

70. Sleep much disturbed by dreams, sometimes pleasant, sometimes anxious.
71. Sleep pretty fair, but disturbed often by nightmare, thinks he is pursued by assassins; suffering from cerebral symptoms.—Obs. xii, *vide* Symp. 81.
72. Troublesome dreams almost nightly, generally restless, often rising in the morning completely enervated, with neither strength, energy, nor courage, depressed exceedingly (20, p. 200).

Head.

73. Dull heavy pain in the whole head, especially the occiput.—*H*[1].
74. Tearing pains at vertex, coming like those of face in attacks so violent the patient shrieks, relieved a little by pressure.
75. Violent tearing, lancinating pains in temples, diminished by pressure, not affected by movement, no swelling or redness.
76. Violent one-sided headache, with nocturnal exacerbations; slight anæsthesia of left side of face, left pupil more dilated than right, slight deafness of left ear with buzzing noises.—Obs. ii.
77. *Cerebral affections* characterised by delirium or coma, or convulsions, or a complication of all three, coming on suddenly or with premonitory symptoms.
78. Premonitory symptoms: insomnia more or less complete, headache sincipital or frontal, with or without vertigo; noise in ears; disordered vision, diplopia, amaurosis, modified conditions of pupils; difficulty in swallowing owing to sense of contraction of pharynx; the mind is weakened, indifferent, sad, weeping. Sometimes there is sudden loss of sight and hearing, often preceded by urine becoming albuminous.
79. Pulse remains unaffected, very rarely irregular.
80. Cerebral attacks unattended by pyrexia, followed by great emaciation.
81. Continued headache and frequent vertigo for fifteen days; he feels a weakness in all his limbs, buzzing in the ears, he sees showers of snow or of fire, then he nearly loses his consciousness and would fall if he did not rest on something. These attacks occur two or three times a day and are followed by intense headache.—Obs. xii.

Commentary on Cerebro-spinal symptoms.

The melancholy disposition so marked in the pathogenesis of lead has been much overlooked in its therapeutic use. Two characteristic cases are narrated by Chapman (*Br. J. Hom.*, iii, 172) where in the lowest triturations it was useful.

It is well indicated in the delirium and mania of drunkards. It merits a trial in many forms of mania. It seems indicated in all forms of cerebral disease where an anæmic condition of that organ is supposed to exist. As many cerebral symptoms do not present themselves in the pathogenesis of lead until cachexia is well established, this condition probably narrows considerably its therapeutic use.

Rush gave lead with advantage in epilepsy. Spence narrates a cure by it in his own person (*N. Amer. Med.-Chir. Rev.*, iii, 897).

Burnett has published a successful case; the patient, a maiden lady, aged 30, had severe epileptic fits, at first irregularly and then at every menstrual period. In this case there were also obstinate constipations and colic. Plumb. acet. 30 was given at various intervals for a year; at the end of this period the fits ceased (*Month. Hom. Rev.*, 1878, p. 20).

In another case reported by S. Brown (*ibid*, May, 1878), occurring in a girl, aged 8, and where there was constipation and painful flatulence, with frontal headache, Plumb. acet. 6 had a speedy and permanent effect.

A case of numbness of upper and lower extremities, paresis of the arms and hands, so much so that a knife frequently dropped from the patient's hands, sickness, constipation, enteralgia, was rapidly cured by Plumb. carb. 1 (Dudgeon, *Br. J. Hom.*, xxix, 612).

Rückert reports recovery under its use of paralytic state of legs after confinement, and another case of partial paralysis of outside of one leg, also case of paralysis of œsophagus.

Indicated in progressive muscular atrophy (see Comm. on Extremities). Sympt. 21, 22 point to its employment in locomotor ataxy. Mr. Thorold Wood records a supposed case, in a child, where recovery resulted from Plumbum 6 (*Annals of Brit. Hom. Soc.*, viii, 375).

Eyes.

Appearances and Sensations.

82. Heaviness and pressure on the eyes: sensation as if eyeballs were too large.—*H*[1]. Dirty yellowish tint of the conjunctiva, which is conjoined, most generally, with a well-marked bluish colour of this membrane.

83. Slight strabismus, sight weak, diplopia of right eye.

84. Lachrymal secretion sometimes remarkably increased, although the eye is otherwise healthy: paralysis of arms (7, ii, 215).

Pupils.

85. When amaurosis is complete, it is accompanied by considerable dilatation of the pupil, and absolute immobility of the iris, which cannot be overcome by the strongest light: when incomplete iris moderately active.

Vision.

86. Amaurosis attending or following cerebral disease.

87. Amaurosis connected with albuminuria.

88. Intense occipital headache, suborbital neuralgia, urine albuminous. The sight, especially in right eye, has been gradually getting weaker; now unable to work.—Obs. viii.

89. Muscæ volitantes, circles of fire, difficult to see objects in the evening, impossible to read, pupils dilated, specially the right. Ophthalmoscopic signs.—*Vide* Obs. viii.
90. Amaurosis due to inflammation and idiopathic atrophy of optic nerve, no cerebral disease or albuminuria; for ophthalmoscopic signs *vide* § 90.
91. Amaurosis. The attacks generally come on suddenly, soon reaching their intensity: both eyes affected, though one may be more so than the other. In a few hours patient cannot discern night from day. Sometimes preceded by frontal headache. There is dilatation of pupil and after absolute immobility of iris: sometimes the iris is unequally dilated. No pain, no turgescence of conjunctiva.
92. When sight is returning objects are seen imperfectly; sometimes the circumference, sometimes the centre of objects is distinguished, so that the first and last letters of a word can be read, but not those in the middle. Sees objects cut in two. Sees only half the objects he regards; this disappeared along with the colic.
93. For some months a periodical transient failing of sight, at the same hour every day.—§ 93.
94. Sees showers of snow or of fire with great vertigo and buzzing in the ears.—*Vide* S. 81 (Obs. xii).

Commentary.

The plumbic effects on vision resemble in a measure those due to alcoholism, to tobacco, and to sulphide of carbon. That of quina produces no change in the fundus oculi.

The very marked disturbance in the eye has as yet no recorded therapeutic results. A case of hypopion after iritis with nocturnal pains in head is reported by Rückert, and another by Theuerkauf, attended with great pain (*Br. J. Hom.*, xxxviii, 303). In same journal, p. 207, is reported a case of vaso-motor neurosis of eye, recovery under internal use of Plumb., but the results may also be due to the local use of atropine.

Mouth.

Gums and Teeth.

100. The margins of the gums of a bluish slaty colour, most marked upon the upper jaw; not present where teeth are absent.
101. Spongy gums, blue lines, looseness of the teeth without soreness of the mouth.—Obs. xiii.
102. Tenderness and swelling of the gums, ptyalism, fœtid breath, constipation.—Obs. xiv.
103. The gums felt to the patient to be in lumps.—Obs. i.
104. Brownish coating of the teeth, especially at their crowns.
105. Carious teeth, break easily.
106. Grinding of the teeth at night, with frequent waking.—*H*.

Inside of Mouth.

107. Dark-coloured spots, like tattooing, on mucous membrane of lips and cheeks.
108. The arch of the palate is insensible to touch, the uvula is drawn to the left, the muscles of palate act indifferently, reflex movements not excited, deglutition impeded.—Obs. x.

Tongue.

109. Tongue whitish, covered with small prominent white points, gums swollen, breath offensive, agonising epigastric pain (acute poisoning).
110. Tongue moist, reddish at the point and margins, covered with a slight white coating, yellow in the middle and at the base.
111. Tongue occasionally swollen, red, dry, and large.
112. Heaviness of the tongue; impeded speech.
113. Embarrassment of speech, trembling of tongue, twitchings of the muscles, intelligence not affected.—Obs. v.
114. Paralysis of speech and voice (7, ii, p. 60).
115. Partial paralysis of the tongue and the lips, producing stammering.
116. Tongue strongly diverted to the left, occurring with slight hemiplegia and anæsthesia.—Obs. x.
117. Complete paralysis of lips and tongue, with loss of articulation (7, ii, p. 60).

Taste.

118. Sweetish, astringent, with fœtid breath.
119. Clammy and bitter: (2 cases).

Breath.

120. Fœtid, most offensive, so characteristic as to be styled saturnine.

Throat and Gullet.

121. Constriction in the throat, difficulty of swallowing.
122. Sensation of a foreign body in the throat—as if a ball were mounting from the thorax into the throat (Tanquerel, Stoll, Hartlaub).
123. Sensation of a foreign body in the throat, exciting sneezing; on swallowing it is felt lower, but soon returns, often disappears of itself; not painful, lasts the whole forenoon.—*H*^{a}.
124. Difficulty in swallowing, owing to sense of constriction of pharynx, though liquids are swallowed greedily and in gulps; preceding cerebral attack.
125. Patient tormented by thirst, desires to drink, but dares not, because he experiences a sense of suffocation as soon as he has swallowed any liquid: (attending an attack of colic).

Stomach.

126. Anorexia.
127. Sense of burning extending from the throat to the stomach, nausea, soon vomiting, acute agonising pains in epigastrium and bowels, sometimes diarrhœa, sometimes constipation—abdomen distended, sometimes retracted, gums swollen, breath offensive, tongue whitish, covered with small prominent white points: (acute poisoning).
128. Superficial inflammation of the stomach after large doses: (rare).
129. Empty risings, eructations; the frequent eructations cause great fatigue.
130. From time to time a painful sensation from the epigastrium to the throat, accompanied with eructations of wind; sometimes nausea and vomiting precede or follow it.
131. Excessively frequent empty risings, leaving a sweetish taste in the mouth.
132. The gas eructed of a fœtid smell and bitter taste.
133. Empty eructations and pyrosis.—H^{b}.
134. Hiccough accompanied with vomiting, eructations, and colic.
135. Nausea, attended with great sensation of fatigue; pressure upwards from the abdomen increases the nausea.
136. Vomiting accompanied with colic in the epigastric region; occurring generally during the remissions of pain.
137. Difficult vomiting attended with great anxiety.
138. Incessant inclination to vomit.
139. Vomiting of fæcal matter, with colic and constipation.—H^{b}.
140. The matter vomited is of a greenish colour, viscous, very fœtid odour, *sui generis*, extremely bitter, coppery taste.
141. After vomiting, a quantity of bile is ejected, at first clear, then very thick, terminated by sanguineous matter, mucus streaked with blood.
142. Occasionally violent pulsations of the aorta felt in the epigastrium, and sometimes prolonged to the umbilicus.
143. Chronic gastric catarrh, with anæmia.

Abdomen.

144. Great accumulation of gas in the digestive tube, producing moveable tumours in abdomen.
145. Gas discharged almost entirely by the mouth.
146. During the remission of pain, the gas circulates with great rapidity through the intestines, accompanied with a species of gurgling noise.
147. Painful sense of distension, relieved by discharge of wind.
148. Furred tongue, constipation, often nausea, more rarely vomiting of mucus in the morning, with a peculiar look of suffering, attend dull pains, extending from epigastrium towards back and extremities, leading on to colic.
149. Violent colicky pains, situated generally in the umbilical region, but often in the epigastric and hypogastric regions, more rarely in

the renal and hypochondriac regions, the loins, iliac fossa, testicles, anus, and thorax.

150. Pain generally springing from the umbilicus.

151. Violent twisting pain, less generally shooting, tearing, burning pain.

152. The pain is so violent that the patient is thrown into the greatest agitation, shrieks, groans, is in constant agitation, shifts from one position to another in order to relieve the pain, the hands forcibly pressed against the abdomen.

153. Pain generally relieved by gradual and steadily increased pressure; in some very rare cases slightly increased.

154. Pressure seems to give such relief that the patient binds himself with cords, &c.; or, as in some cases, gets his comrades to stand upon his abdomen.

155. The pain remits, the interval of remission varying from a few seconds to hours, and even whole days. During the remission, a sensation of contraction, of pinching.

156. No pyrexia, the pulse falls to 50, even 30, full and hard.

157. The intervals of remission irregular.

158. Pains generally worse during the night.

159. *Umbilical colic.*—Depression of this region, with hardness of the corresponding parietes, constipation, nausea, but rarely vomiting; when this exists it is slight.

160. *Epigastric colic.*—Pain, depression, and hardness of the epigastrium, nausea, frequent and abundant vomiting, anorexia, and thirst; pulsation of the aorta in the epigastrium; dyspnœa, and other functional alterations of the respiratory organs. In some rare cases jaundice, if pain extend to the hypochondrium.

161. *Hypogastric colic.*—Pain, depression, and tension of the hypogastrium, difficulty of emitting urine, tenesmus of the bladder; pain and spasmodic movements towards the genital organs.

162. Enteritis (*rare, only after acute poisoning*).

Liver.

163. Retracted occasionally during attacks of colic; remains permanently so in some case of confirmed cachexia.

164. Hepatic jaundice not produced.

Anus and Fæces.

165. Obstinate constipation, sometimes lasting eight to fourteen days.

166. Knotty fæces, scybala, hard, dry, yellow or black, passed with much pain and straining.

167. Motions very rarely loose except towards the end of cachexia, and after acute poisoning where much irritation has been set up.

168. Frequent and fruitless efforts to evacuate, causing great fatigue, sometimes hæmorrhoids.

169. Violent retraction of the rectum, during the attacks of colic, similar to cramps.

170. The introduction of the finger into the anus gives great relief, provokes desire to go to stool, and the evacuation of gas.

Commentary.

Plumbum is one of the most useful medicines in *enteralgia*, especially when the pain seems unconnected with flatulence or mucous disorder, when it is attended by constipation, and approaches the character of a neuralgia: it is a colic relieved by pressure, and has a great tendency to spread into the renal and vesical regions.

The abdominal and crural *arthralgia* or *myalgia* indicates its employment in similar pains occurring in the hysteric habit.

General use has confirmed the value of lead in *constipation*, especially when the motions are scybalous. In *intestinal obstruction* attributable to lodgment of hardened fæces it is one of the most valuable remedies. When the obstruction is due to other removable causes opinions differ as to its value. The obscurity which hangs over the pathology of many of these cases probably accounts for this difference of opinion. Jousset and Hughes assign it a high place, whereas Bähr denies its homœopathicity, because "lead causes a severe contraction of the abdomen, which becomes as hard as a board: in incarceration, on the contrary, it is always very much distended" (*Sc. Therap.*, i, p. 483). Not necessarily so; we have seen incarceration which at last proved fatal, exist for a long time without distension: in Drysdale's case of obstruction, where Acet. Plumb. 1 was of very manifest service, there was no distension (*Br. J. Hom.*, xvi, 76). In Lorbacher's case of obstruction there was extreme distension, yet Plb. cured. (*Br. J. Hom.*, xxix, 611.) Retraction of the parietes is very characteristic of lead colic: but this metal causes extreme constipation without retraction, and Sympt. 127 shows that there may be vomiting, abdominal pains, constipation, *abdomen distended,* sometimes retracted. For further evidence of its use in obstruction, see end of § 14.

Well indicated in spasm of the anus and rectum: characteristic case, of ten' years standing, recorded by Chapman, cured by Plumb. (*Br. J. Hom.*, iii, 174). In general spasm of the sphincter ani, independent of fissure, is much increased by touch, which is the reverse of sympt. 169, 170.

Urinary Organs.

Bladder.

171. Desire to urinate, fruitless efforts, or the urine passed drop by drop: during hypogastric or renal colic.

172. Frequently itching and great heat in the urethra either before, during, or after the emission of urine: with renal colic.

173. Sharp pains relieved by pressure, shooting from the renal region to the bladder.
174. Painful sense of constriction towards the neck of the bladder, difficulty of introducing a catheter.
175. When the paroxysm of pain (colic) has subsided, the catheter is easily introduced, and without pain; attempting to do so during the accession causes great pain.
176. If he urinates at the moment of the attack of vesical pain, the stream of urine is suddenly interrupted, and the penis retracted.
177. Experiences a sensation as if the penis were tied at its root with a cord.

Urine.

178. In rare instances urine nearly suppressed, and retained: in one case catheter could not be passed for three days.
179. Paralysis of sphincter, which allows urine to pass *guttatim*, occurring with lead paralysis: (*very rare*).
180. Albuminuria, temporary.
181. Highly albuminous, containing numerous casts, attending granular degeneration and atrophy of the kidneys: (for post-mortem lesions of kidneys, Obs. v).
182. Headache, drowsiness, vomiting, epileptiform convulsions, coma, attending uræmia occurring in the course of diseased kidney.—Obs. vii.
183. Temporary albuminuria with amaurosis, muscæ volitantes, severe occipital headache.—Obs. viii.
184. Granular degeneration of the kidneys.
185. Tubal nephritis.
186. Urea, uric acid, phosphoric acid are diminished; the colouring matter increased: early stages. With this state of urine there is an increase of urea, uric acid, and phosphoric acid in the blood.
187. In advanced stages the urine is as above, with a diminution in the quantity and sp. gr.
188. In confirmed cachexia urine is hæmapheic, like that in hepatic jaundice, but biliary acids absent.
189. An acute attack may produce a brick-coloured sediment, or an appearance of albumen.
190. Probably checks the renal elimination of uric acid, the functions of the kidneys becoming more or less intermittent.

Commentary.

The constancy with which permanent *albuminuria and granular degeneration of the kidneys* arises from exposure to lead is generally admitted; but notwithstanding this its employment in homœopathic practice has been much overlooked. Bähr makes no mention of it. Hughes has rightly drawn notice to the importance of this remedy (*Therapeutics*, ii, 233). Jousset has been disappointed with its results: the writer has seen failure, but also decided benefit from the *steady and long-con-*

tinued use of the lower triturations. So also Dr. S. A. Jones, in *Amer. Obs.*, vol. xii. The improvement could hardly be explained by the natural remissions which occur in this fatal disease. Lead also sets up a temporary hyperæmia of kidneys and tubal nephritis, indicating its employment in various forms of temporary albuminuria and uræmic poisoning.*

The temporary and permanent albuminuria of lead is *never accompanied by œdema*. This circumstance limits its therapeutic use. Again, a limitation may depend on the answer to this question—Is the renal affection a specific effect, or is it due to the constant elimination of lead by the kidneys?

Genital Organs.

Male.

191. Tearing or constrictive pains affecting the spermatic cord, testicles, and penis.
192. Unattended by swelling or tenderness, relieved by pressure.
193. The scrotum and penis much retracted, the testicles drawn up towards the groin. Penis so retracted as to be hardly visible; sensation as if tied at its root.
194. Sometimes renal colic pains extend to urethra causing strong and sudden contraction, arresting the stream of urine; with this pain sometimes a sense of heat before and after micturating.

Female.

195. Young girls suffer from retarded menstruation. Suppression partial or complete of menstruation, with marked anæmia-chlorosis.
196. Hysterical attacks easily excited.
197. Great tendency to abortion or premature labour.
198. Metrorrhagia attendant on abortion.
199. Children are stillborn or very sickly.
200. Tearing and constrictive pains affect the uterus and vagina like labour pains.
201. Pains attended by contraction of vagina; no swelling, no tenderness, relieved by pressure.
202. Vaginismus.

Commentary.

Levrat-Perotton, in 1829, advocated its administration in various neuroses of the generative organs (*vide* § 14). Various old writers gave it in hysteria and melancholia. The writer recommends it in some forms of hysteralgia, especially with irritable spine. In two cases of

* The *Medical Age* (quoted in *N. Engl. Med. Gazette* for May, 1883) records two cases of acute and two of chronic albuminuria treated successfully with lead, in doses of 15 or 20 grains of the acetate.—R. H.

neuralgia of testicle and spermatic cord, it relieved one, and in the other cure occurred during its use. It merits much more attention in chlorosis then it has hitherto met with ; the presence of this state with pure neurosis of the female genital organs is an indication for its use.

Circulating Organs.

Blood.

203. Red corpuscles are diminished in number, sometimes to one half the normal amount: they become larger and less elastic: though individually increased in size, their surface and volume in a cubic millimètre of blood is inferior to the volume of normal corpuscles.
204. No hydræmia.
205. Uric acid often present in the blood. Probably checks the renal elimination of uric acid.

Heart.

206. Sounds—at first purely anæmic, then after a time they may become reduplicate, rough and blowing, and return to the anæmic.
207. Hypertrophy of left ventricle, lesions of aortic valve, atheromatous degenerations, described by some as due to lead.
208. Strong palpitation of heart, slight systolic murmur towards apex, with temporary albuminuria, and encephalopathy.—Obs. ix.
209. Uniformly more or less weakened impulse of heart ; on going upstairs some faintness and cardiac distress.
210. Sensation of tightness and constriction in præcordial region and round chest.
211. Oppression and palpitation of the heart with anxiety.
212. Stitches extending from the left breast to the left arm and between the scapulæ, disappearing suddenly.
213. Violent acute pain mounting from the epigastrium into the chest, extending along the internal face of the upper extremities ; the patient is a prey to the keenest agitation and cruel anxiety ; he sits in bed suffering from violent palpitation of the heart, and sensation of suffocation which even advances to syncope.
214. Pains resembling *angina pectoris*.

Pulse.

215. Never quick, irregular, or intermitting except towards the fatal termination of cerebral attack ; and of cachexia.
216. Weak, soft, thready, easily compressed : (with the cachexia).
217. Hardness and peculiar vibration of pulse with marked diminution

of frequency, sometimes falling to 40 during attacks of colic, becoming quicker when attack ceases.

218. Sometimes, but rarely, soft, and quick for a second, then slow.

219. Dicrotism, tricrotism.

Commentary.

F. C. Winter, of Lüneberg, round it useful in *chlorosis* marked by orthopnœa, constipation, œdema of feet and unusual muscular debility, where various ordinary allopathic and homœopathic remedies had previously failed. Drysdale, struck with Andral's observation on the anæmio-chlorotic condition of those under the influence of lead, tried lead in this diseased condition, and he found it then and since a useful remedy. He has given it after other remedies had removed active digestive disorder, and there remained dyspnœa, obstinate constipation, scanty or suppressed menstruation, muscular debility (*Br. J. Hom.*, iii, 223). The writer's experience agrees with this.

It is a remedy worthy of trial in *pernicious anæmia*. Goullon reports a case in a young postman, where first arsenic, and them Plumb. acet. 30 were very useful. The indications were extreme costiveness, pain in stomach, the ghost-like expression of face, the pale waxy hue of skin, power of vision diminished (*All. hom. Zeit.*, Bd. 101, No. 7). It is useful in *weak cardiac action* dependent more on the condition of the blood than of the cardiac muscles.

Sympt. 214 is more probably akin to the neuralgia of the thoracic parietes than to true *angina pectoris*.

Respiratory Organs.

Larynx.

220. Sensation as if the trachea were drawn together with cords.—H^{b}.

221. Roughness in the throat; rough hoarse voice.—H^{b}.

222. The voice loses a great degree of the intensity of its timbre, it is as if choked, most marked when the colic is violent.

223. Voice is nasal, words not pronounced distinctly, with anæsthesia of palate.—Obs. x.

224. Trembling of the voice.

225. Aphonia permanent.

226. Aphonia remittent, temporary, coming on with attacks of colic.

227. Aphonia, attributed to paralysis of recurrent nerve.

228. Aphonia, complete, in collapse from acute poisoning.

Lungs.

229. The respiration hurried, incomplete, painful, gasping, choking, during the attacks of colic.

230. Paralysis of the intercostals, inducing fatal asphyxia, often attended by aphonia.
231. The intercostal muscles on the left side were now affected: for months I could not sneeze; if attempted it was at once arrested by pain in these muscles (20, p. 190).
232. Laboured movements of chest and diaphragm.
233. The anterior and lateral parts of chest are the seat of violent lancinating pains, attended with sense of constriction: unable to dilate chest owing to the pain.
234. Extreme dyspnœa attended with great anxiety and restlessness; deep inspirations accompanied by epigastric pains and palpitation; cough painful and convulsive, no expectoration; face pale and covered with cold sweat: much nasal mucus: percussion normal.
235. Long, intermittent paroxysms of violent dry cough, preventing sleep, attended with dyspnœa, and signs of chronic bronchitis: accompanied with cold creeping sensation of the skin: no perspiration can be excited.
236. The friction of the muscles of chest was so loud that, combined with the symptoms, I had great difficulty in satisfying myself she had not pleurisy.—Obs. xv.

Commentary.

Sympt. 234, 235 are probably the result of mechanical irritation from particles of lead producing disturbance similar to those of steel-grinders. It may be indicated in affection of the intercostals attending spinal disease.

Skin.

237. Dirty earthy yellow tint, at first of a pale yellow hue, not affected by emotion or exercise, due to anæmia.
238. Occasionally, in confirmed cases, there is decided yellow colour, as in jaundice due to obstructed gall-ducts, but no such hepatic state is present.
239. Cutaneous anæsthesia, in various regions (*vide* Sensibility).
240. The paralysed parts become atrophied, the skin whitish pale, of a livid aspect, more frequently yellowish earthy, rough to the touch, dry as if sunburnt; it seems to have lost its thickness; the epidermis falls off in scales, the skin becomes loose and flabby (7, ii, 34).

Back and Neck.

241. Violent pain in the back, between the shoulders, which was relieved by getting on his bed, lying flat and applying as much pressure as he could: also pains in other parts (20, p. 190).
242. Tearing contusive pains in the loins, between the shoulder-blades

and sides of chest, increased by laughing or deep inspiration.—*H*[b].

243. Pains limited to the renal region or extending along the course of the ureters towards the bladder with diminution, sometimes amounting to suppression, of urine: the patient can sit or bend forwards without increasing the pains.

244. Acute pain for now fifteen days in many joints, especially those of the lumbar spine and shoulders; he had also analgesia of all the right upper extremity.—Obs. xii.

245. Two painful zones over the articulations of the neck, the knees, and the feet.—Obs. xi.

246. Pains affecting the muscles of the back and lumbar region increased by motion, unattended with disorder of the urinary organs.

247. Violent pain in the neck, attended with torticollis.

248. Tetanic stiffness of neck and limbs occurring with epilepsy.—Obs. ix.

249. Paralysis of the sterno-cleido-mastoidean muscle of left side: (rare) (7, ii, p. 61).

250. Paralysis of the pectoral and great dorsal muscles.

Superior Extremities.

251. Sense of numbness and formication in the fingers, especially of right hand, followed by painful prickings: weakness of right hand; complete analgesia of all the right upper extremity.—Obs. xii.

252. Acute pains in many joints, especially of lumbar vertebræ and shoulders: least movement excites the pain, pressing the surfaces of the joints together causes acute distress; pressure round joint less felt. The muscles free from pain: no redness, no swelling.—Obs. xii.

253. Sense of fatigue, of weight in the paralysed parts, especially in the joints: sensation as of a heavy weight attached to the limbs.

254. Extreme feeling of cold in palsied parts, increased by the least current of air.

255. *Paralysis* rarely sudden in its onset, generally preceded by sense of pain and dulness in affected parts.

256. Paralysis affects the upper much more frequently than the lower extremities; the extensors are especially affected.

257. General paralysis of the superior extremities: (rare).

258. Paralysis of the arm, forearm, wrist, and finger.

259. Paralysis of the extensors of wrist and fingers, "wrist drop," the most common.

260. Paralysis of the fingers.

261. The affected muscles soon become atrophied. Deformity of affected parts after continuance of the paralysis: the palsied muscles so atrophied that the eminences of the bones can be easily distinguished: the ligaments yield and permit the head of the bone to start from the socket.

262. Upon the extreme emaciation supervenes partial or general infiltration of the limbs, on which soon appear large eschars, and gangrenous patches: diarrhœa sets in and copious expectoration.

263. The palsied parts often covered in the morning with copious viscid perspiration.

264. *Trembling* attended with extreme weakness of the muscles.

265. Trembling when it continues long leads generally, but far from always, to paralysis of the muscles. *Ataxy* of arms and hands.—*Vide* S. 21, 22, 23.

266. Indolent swelling, rarely attended by redness, appearing on the dorsal aspect of the hands of persons affected by paralysis of the extensors: *chronic synovitis*.

267. The superficial veins of the hand and forearm present marked zones of contraction, especially at the point of union of veins, like a string of beads; more marked on moving the parts; no induration; not like varicose condition.

Inferior Extremities.

268. Arthralgic pains preceded by heaviness and lassitude of the parts about to be affected.

269. Pains affect principally the flexor muscles, as the groin, the posterior part of thigh, the ham, the calf of the leg, and sole of the foot.

270. Most painful at the bends of the joints; rarely affect the smaller joints.

271. Pains tearing, sometimes burning, violent shooting, sometimes like sensation of needles and pins.

272. Worse during the night, come in paroxysms, relieved by pressure.

273. During the paroxysms, the patient is a prey to the greatest agitation, features pinched, he sobs, cries aloud, continually changes position, pushes his limbs out of bed, applies them to a cold body, compresses with his hands the affected parts.

274. Pains attended with cramps, and violent contractions of the muscles; limbs extended with difficulty, cannot stand or walk but with effort.

275. Peculiar sensation of burning in the feet, relieved when in bed by pressing feet against cool footboard: he had also pains in back and intercostals, and a patch 3 inches by 4 in the anterior part of thigh where there was complete anæsthesia (20, p. 191).

276. Painful sensation of paralysis in the hip-joints and in those of the knees and feet.—*H*[s].

277. General paralysis of the lower extremities: (rare).

278. Paralysis of the leg and foot.

279. Paralysis of the extensor of the great toe.

280. Walking difficult, drags right leg, which is weaker than left; motility of right arm diminished, with slight atrophy of extensor

muscles: complete analgesia and anæsthesia of whole of right side. —Obs. x.

281. Ataxy; on trying to walk with the eyes shut he strikes his head on the ground; he trembles and would fall were not someone at his side.—Obs. xi.

Commentary.

Two cases of progressive muscular atrophy have just (*Revue Hom. Belge*, March, 1884) been reported by Dr. Seutin, of Brussels, in which Plumbum was as curative as it is homœopathic. The first was of a man of forty-five, of robust constitution, and hitherto enjoying good health. In March, 1880, he began to experience fatigue on movement, and power gradually declined. The muscles wasted and grew flabby. The symptoms began on the right side, and after nine or ten months involved the left also. In a year's time the patient was unable to walk. Pruritus and cramps supervened in the legs. When Dr. Seutin saw him in March, 1883, he had lost these, but paralysis was complete. The muscular atrophy was very marked, and the "fibrillary contractions" of the disease were observed. Cutaneous sensibility was diminished. The general condition was good, but the bowels were very costive. Plumbum was given in the third trituration night and morning. In a month improvement had set in, in six months he could walk for half an hour at a time, in ten he was well. The second case occurred in a nun: the malady was of eight months' standing when (in April, 1883) the treatment was commenced. The right side only was at this time affected, but the symptoms were indubitable. Plumbum was given as before, and continued for three months, by which time the cure was complete.

Dr. Jousset has recorded a case of the analogous acute anterior poliomyelitis, in which recovery took place under Plumbum 30 (*Leçons de Clinique Médicale*, p. 465).—R. H.

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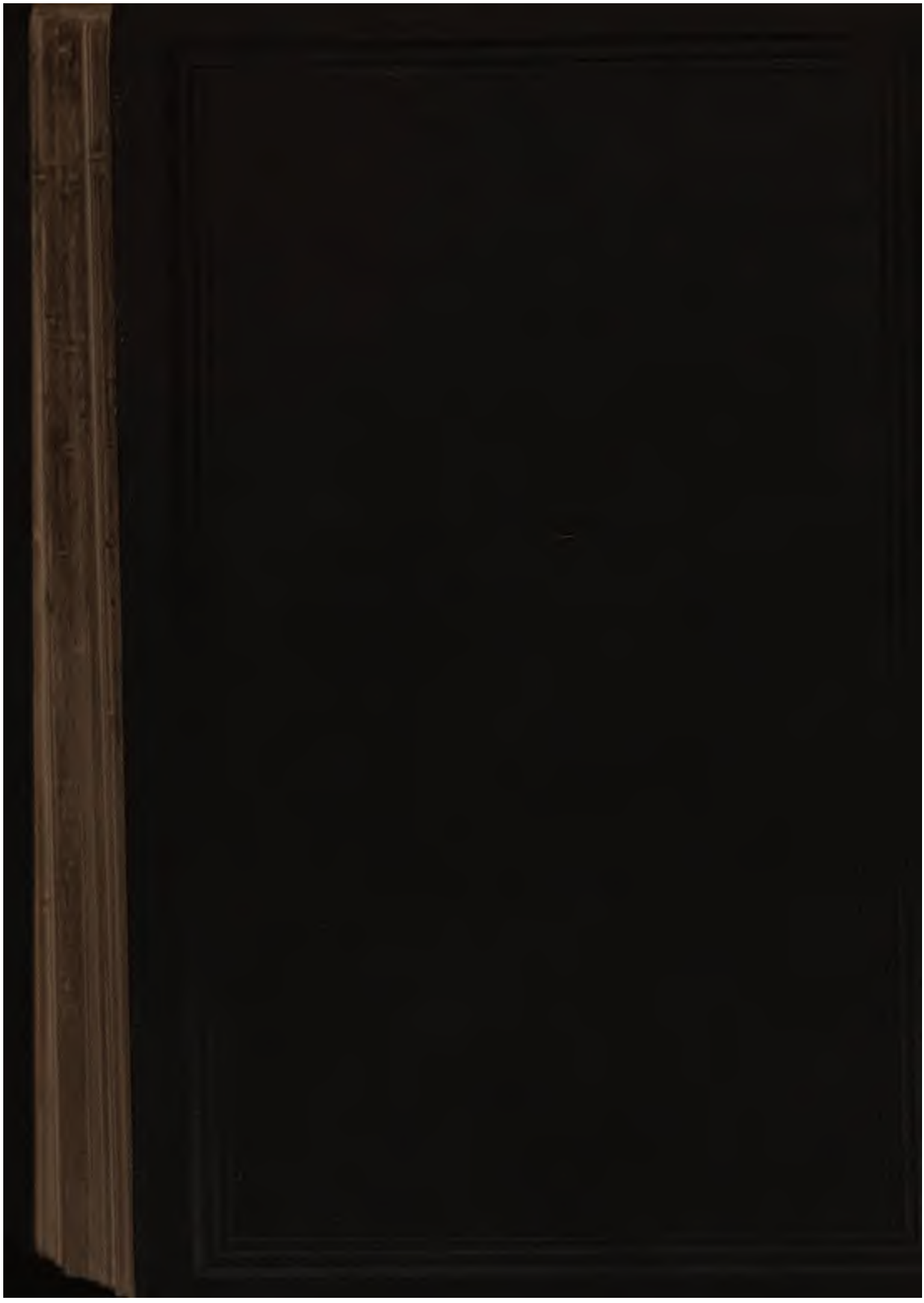
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